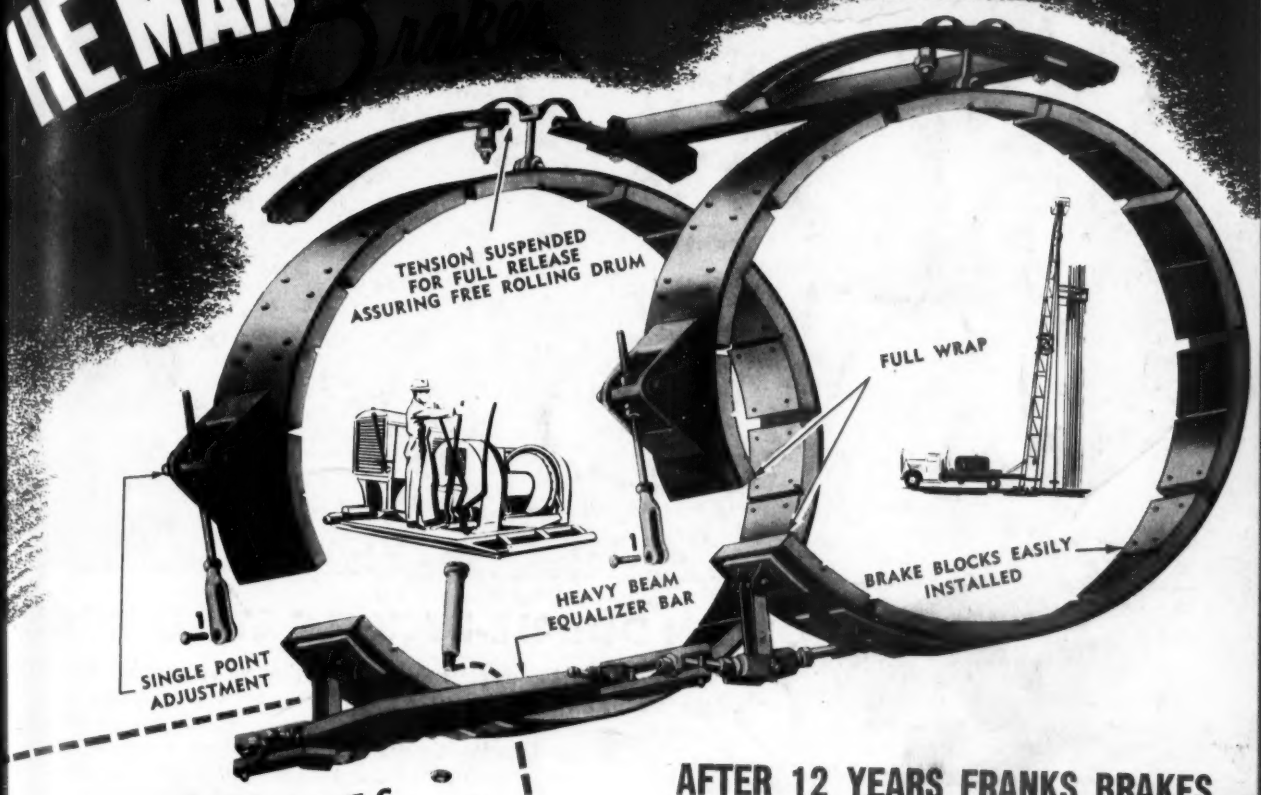
APR 9 1948

The OIL AND GAS JOURNAL

THE MAN Brake



MAIN FEATURES

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AFTER 12 YEARS FRANKS BRAKES DIDN'T NEED RELINING

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The Franks design incorporates a rapid brake and low leverage at the start of the lever pull and extreme leverage and low brake at the end of the lever pull.

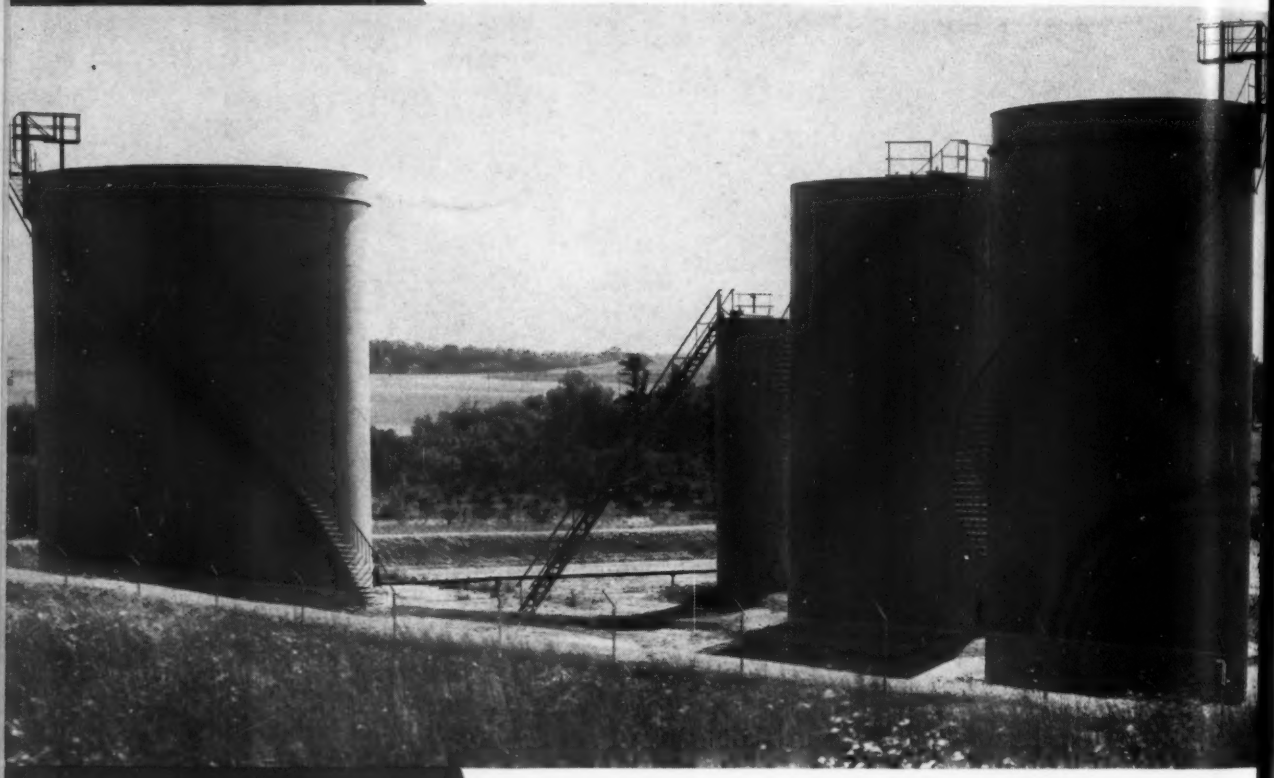
This allows the operator to take up his brake rapidly in the range where there is little load and to obtain extreme leverage and minute adjustment in the range where loads are high. Upon release greater brake band clearance assures free drum operation.

See Franks Exhibit at the Oil Show in Tulsa in May

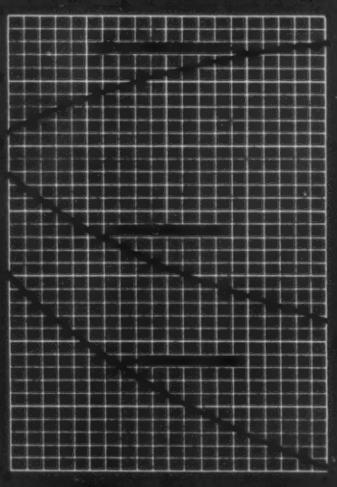
FRANKS MFG. CORP.
WELL SERVICING AND DRILLING UNITS
TULSA, OKLAHOMA

...speaking of evaporation losses...

WHAT'S HAPPENING TO THE OCTANE RATING OF YOUR GASOLINE?



MAINTAIN IT WITH HORTON DOUBLE-DECK FLOATING ROOFS



For each barrel of gasoline that you lose through evaporation during the storage period, there is a corresponding drop in the vapor pressure and the octane rating of the remaining gasoline. For example, if you are storing a 10-lb. Reid motor gasoline, a volumetric loss of 1.0 per cent is accompanied by 0.8-lb. decrease in vapor pressure and a *one point* drop in octane rating.

Evaporation losses from fixed-roof tanks are much greater with present-day gasoline than when less volatile gasolines were used. The essential quality of these products can be maintained only by using pressure storage tanks or flat-bottom tanks with roofs that prevent evaporation loss.

The Horton Double-Deck Floating Roof is used to prevent evaporation loss from flat-bottom tanks. It is particularly advantageous for tanks having a high throughput. It has a minimum of 15 inches of dead air space between its two decks. This insulates the liquid and eliminates boiling losses from all but the most volatile of products. By floating directly on the liquid at all times, this roof eliminates the air-vapor space in the tank and stops evaporation losses caused by breathing and filling.

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Table of Contents

NEWS DEVELOPMENTS

Record Demand to Tax Refiners' Ingenuity, W.P.R.A. Told ... 40
Krug Scores Wherry, Hadlick in Connally Act Dispute ... 42
Steel Estimates Too High, Bruce Declares ... 42
New Bill Would Defer Government Synthetics Program ... 44
First Exhibits for I.P.E. Hall of Science Arrive ... 45
Military Oil Needs Scaled Down Slightly ... 45
Lack of Crude Oil, Strikes Slow French Refineries ... 46
Three Socony Refineries in Europe Reopened ... 47
Australian Asphalt Plant to Use Bahrein Crude ... 47
Results of Pemex-Cities Service Talks Awaited ... 47
Mountain Provides Operating Clues for Huge Limestone Field 48
Contract for 8,000-Hp. Jet Engine Let ... 52
House Defeats Efforts to Modify Oil Section, Passes ERP Bill 53
Rubber Plants May Be Sold Under New Law ... 53

Editorial ... 39
This Week ... 43
International News ... 46
Watching Washington ... 50
Refining News ... 108
Pipe-Line News ... 111
Natural-Gas News ... 120
Natural-Gasoline News ... 120

ENGINEERING AND OPERATING

California Research Corp. Expands Laboratories ... 62
Preplanned Program Followed in Newest Unit Project ... 64
Natural Gas, Coal, Oil Shale and Liquid-Fuel Sources ... 66
Some Observations on Casing Strain After Cementing ... 72
New Midget Gasoline Plant for Smaller Leases ... 77
Wildcat Drilling in 1947 ... 79
Petroleum Engineering Schools: Texas A. & I. ... 86
Questions on Technology ... 92
Engineering Fundamentals: Capillary Pressure ... 99
The Refiner's Notebook: Pressure-Temperature Ratings ... 101
Oil and Gas Equipment Digest ... 103

EXPLORATION AND DRILLING

New Trends in Exploration Research Thinking ... 123
Highlights of Week's Developments ... 123
Reports by Areas Start on Page ... 124
Weekly Well-Completion Record ... 140
Daily Average Production for Week ... 141

ADDITIONAL FEATURES

Personals ... 54
Deaths in the Industry ... 61
Drilling Contractors ... 115
Market Summary ... 142
Men in Equipment News ... 144
Classified Advertising ... 146
Events on the Calendar ... 150
Advertisers' Index ... 150

HERE IS THE SOLUTION OF A DIFFICULT *Problem!*

It has always been difficult to perform a successful cement job at some desired point above the bottom of the hole — and at the same time prevent contamination by the cement slurry of permeable, low-pressure zones below the cementing point.

This operation is now safely and efficiently performed by using the Baker Triplex Cementing Shoe (Product No. 136) or the Baker Triplex Cementing Collar (Product No. 138) which is similar in internal construction and in operation to the Triplex Shoe.

The simple operation of TRIPLEX Equipment is evident from the accompanying drawings which illustrate the ease of floating-in casing strings of any size or length — the efficient distribution of the cement slurry — and the protection of permeable, low-pressure zones below.

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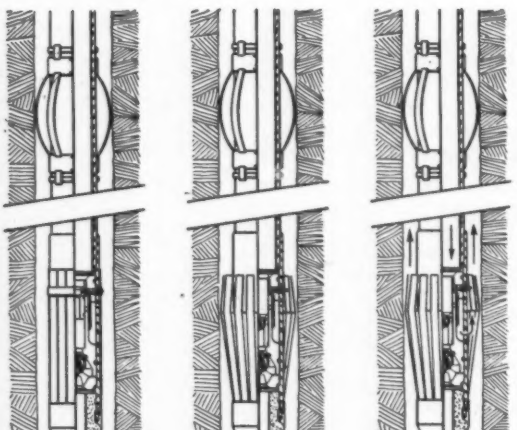
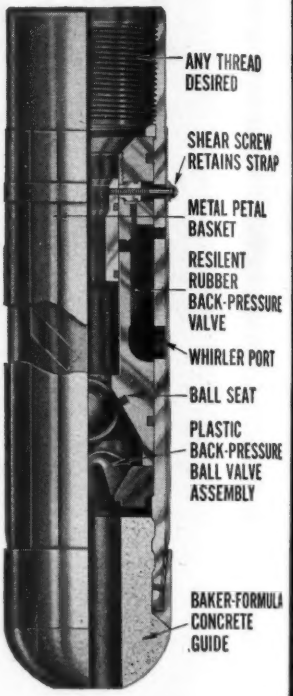
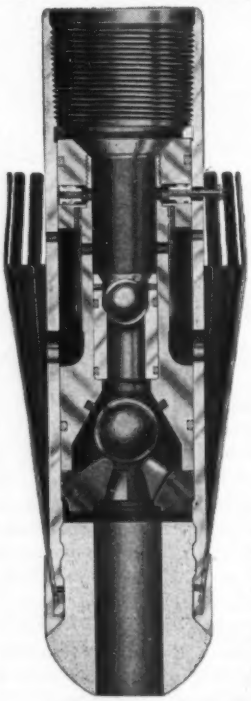


The Baker Triplex Cementing Shoe (left) in running-in position, centered in the hole by a Baker Casing Centralizer. In the center illustration the Tripping Ball has been dropped, seated, and the Tripping Valve forced downward. This action shears the shear screw holding the Metal Petal Basket against the Shoe, and permits the Metal Petal Basket to expand against the side walls of the hole. The ports are now open ready for cementing. At right, cementing is under way, with the slurry directed upward to completely encase the centered pipe with a uniformly thick body of cement with the expanded Basket retaining the cement above the Shoe.

The Baker Triplex Flapper Valve Float Collar (Product No. 134) may be run in place of the Triplex Baffle Collar when an additional float valve is desired. Note how it is designed to permit passage of the Tripping Ball, and how an ample flat surface is provided for "bumping" the cementing plug.

At right the Triplex Shoe is shown in running-in position, with the Metal Petal Basket held against the Shoe by the hold-down strap which is fastened by a shear screw.

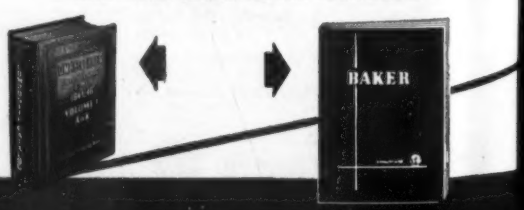




The Triplex Cement Baffle Collar (Product No. 137) is run a joint or two above the Shoe and serves as a stop for the cementing plug, so that mud-contaminated cement is retained inside of the casing. The hole is bevelled at its top to permit easy passage of the Tripping Ball.

(Left) The Tripping Ball has been dropped and seated on top of the Tripping Valve. Pressure of about 500 psi has sheared the shear screws and forced the Tripping Valve down to expose the cementing ports. Shearing the screws also permits the Metal Petal Basket to expand against the side walls and form a bridge which holds the cement slurry above the Triplex Shoe and protects permeable, low-pressure zones below from cement contamination.

Complete details are in the 1948 Baker Catalog — and THE COMPOSITE CATALOG



BAKER TRIPLEX CEMENTING EQUIPMENT

THE OIL AND GAS JOURNAL

Oil Profits

PUBLIC discussion of the high earnings currently being reported by oil companies largely ignores the fact that the bulk of these profits is being plowed back to create facilities for supplying the ever-growing demand for petroleum products.

The 1947 annual statement of almost every oil company, large or small, stresses the amount of money being spent to discover and develop new reserves and build more pipe lines, refineries and other facilities. In some cases these expenditures exceed total net earnings.

High earnings are not only justified by current conditions confronting the industry but they are essential if consumers' wants are to be supplied. Without substantial profits on present operations there could be little growth, and before long the public would be faced with a very genuine oil shortage.

Historically the growth of the oil industry has been financed largely out of earnings of the operators rather than by outside capital. Consumers, not bankers, have built the oil industry.

Today's consumers are buying tomorrow's oil. This cannot be done at yesterday's costs. Growing demands require the industry to replace reserves and expand its capacity, and at costs 50 to 200 per cent above prewar.

The public has been getting its petroleum products from crude reserves developed and facilities installed prior to the war. Petroleum is a wasting asset, and to maintain its position the industry must constantly reinvest a substantial part of its earnings in exploration and drilling. Manufacturing and distribution facilities must be maintained, modernized, and expanded to keep pace with technological progress and larger market demands.

Under accounting and tax requirements, book reserves for depletion and depreciation are based on original cost of the properties, but to meet today's replacement costs the industry is setting aside large portions of its so-called net earnings to cover these items adequately. Thus the published profits figures are not a true picture of actual earnings.

The cost of living for corporations has increased fully as much as for individuals. When the business dollar will buy only half as much as before the war a company must have twice as many dollars to stay in the same place, to say nothing of expanding.

Dividends were generally higher than in previous years, but the increase in oil stockholders' "take home pay" is not out of line with the increase in wages and salaries generally.

It is against this background that oil-company earnings must be evaluated. If the oil industry lacked the profits with which to replace its crude reserves and expand its facilities then there would be real cause for public concern.

PETROLEUM—A *PROGRESSIVE* INDUSTRY

Record Demand, Still Rising, to Tax Refiners' Ingenuity, W.P.R.A. Told

by Dahl M. Duff

GALVESTON.—A steadily increasing demand for petroleum products, the troublesome international outlook, continued labor-management difficulties, and the need for better public understanding of the oil business are among the major problems which the industry is currently facing, H. T. Ashton, president of the Western Petroleum Refiners Association, declared here April 6 at the association's thirty-sixth annual meeting

Demand for refined products, Ashton said, is still increasing above the record levels of last year, and from present indications the summer and winter ahead "will tax the capacity and ingenuity of our industry after satisfying governmental requirements." At present, he added, demand is at the rate of 600 gal. per capita annually against 367 gal. 10 years ago.

H. T. ASHTON

"There has not been much improvement in some of the most important things which shape our businesses and our lives," he declared. "The international situation is oppressive and continues to bring new problems. The relations between labor and management, while considerably improved, have yet a great distance to travel to insure maximum efficient production. . . ."

Public Not Informed

Ashton said there still is too much difference between the picture of the industry as seen by the public and that which actually exists. To keep the industry from being "wrested from those who made it great, it is necessary to focus the clear spotlight of truth and knowledge on what we are doing and why we are doing it."

In his talk, Ashton paid tribute to the work of two association leaders who died last year: C. L. Henderson and Roy B. Jones. Both were former W.P.R.A. presidents.

Ashton, who is with Socony-Vacuum Oil Co., Inc., in St. Louis, was reelected for his third term as association president. The four vice presidents, T. A. Helling, El Dorado Refining Co.; R. W. McDowell, Mid-Continent Petroleum Corp.; T. M. Martin, Lion Oil Co.; and R. L. Tollett, Cosden Petroleum Corp., were reelected. Only change among the directors was the election of Roland V. Rodman, Anderson-Prichard Oil Corp., to succeed L. H. Prichard.

The 3-day meeting opened here April 5. Refining officials at the meeting were guests of Ethyl Corp. at a buffet supper Monday evening and of the refining supply and service companies at a party and dinner Tuesday.

Octane Race Ended

Motorists cannot have both more gasoline and higher octane gasoline for the next several years, so the problem must be attacked jointly by the refining industry and automobile designers in a way to provide the most economical transportation with the lowest consumption of natural resources, the W.P.R.A. was told by M. W. Holaday, of Socony-Vacuum Oil Co., Inc.

The steady rise in the average octane rating of motor gasoline which has been going on for years has virtually ended and cannot be continued, Holaday said, citing these reasons:

During the next 5 or 6 years the oil industry must prepare to supply an additional 1,000,000 bbl. per day of products, which will require expenditures of some $2,500,000,000 for exploration and production, $250,000,000 for pipe lines and tankage, and perhaps another $2,500,000,000 for refinery, product-handling, and distribution equipment.

With the exception of reforming and its variations, which improve quality at a sacrifice in gasoline yield, all new processing techniques that have been introduced into the refining scheme in the past 35 years have increased gasoline yield and simultaneously have produced superior antiknock quality.

Since 1937 the Motor octane number of regular gasoline has increased from 60 to slightly above 76—an average rate of increase of 1 octane number per year—and premium grade has increased about ¾ of an octane number per year. Whether or not the petroleum industry can meet the demand for higher and higher octane number gasolines and maintain past trends in antiknock quality is a serious question and will remain so for years.

All refining equipment is now being operated at maximum throughput to meet quantity demands. Refining facilities must be built to meet increasing quantity requirements before emphasis can be placed on construction for quality. As more processing equipment is added to a refinery more fuel must be burned to provide the heat required for the increased processing —meaning an increased usage of natural resources regardless of the type of fuel burned.

Looking far into the future, it is possible to visualize a total refinery gasoline having an octane number of 89/99 with 3 ml. TEL per gallon or about 87/97 with 1 ml. TEL per gallon by hydroforming all straightrun gasoline and doing all cracking catalytically. Such a refinery would cost in excess of $90,000,000 for 100,000 bbl. per day of crude charged. About 20 per cent of the straightrun gasoline will be lost in hydroforming, and the operating expenses will be very high.

In general, cracking processes and those converting the heavier parts of the fuel gas into gasoline produce low-cost octane numbers since the product value is increased. In contrast, the reforming processes produce high-cost octane numbers since product value is decreased.

Costs Still Rising

The investment required for today's octane numbers is high and will increase rapidly if higher antiknock quality gasolines are required. During the war years $927,000,000 were expended on major refinery projects, including $864,000,000 for aviation gasoline. Between 1941 and 1946 premium and regular grades of motor gasolines increased barely 3 octane numbers in spite of the fact that aviation-fuel production had been largely diverted to motor gasoline by 1946. In other words, an increase in over-all antiknock quality of 1 octane number did cost then in the neighborhood of $300,000,000. At present construction costs, investment per octane number is 50 or 60 per cent higher.

Because the oil industry must spend more than $4,250,000,000 to meet quantity demands and because there is a limit to the amount of refinery equipment which can be installed in any one year, it will be several years before much can be done toward improving gasoline quality.

After reaching the conclusion that significant increases in gasoline octane number will not be forthcoming for several years, Holaday declared that there is, nevertheless, real justification for higher antiknock quality, saying:

"It is apparent that very marked savings in fuel consumption can be achieved by the route of higher compression ratio coupled with proper engine and car design. These savings can be obtained at a price—the cost of producing gasolines of suffi-

ciently high antiknock quality to meet the requirements of the high compression ratio engines.

"One major point should be emphasized. It is recognized that high compression ratios can be utilized to effect fuel savings or, alternatively, to effect improvements in vehicle performance — faster pick-up and higher speeds.

"If, as has been indicated in some quarters, the high compression ratio engines with their attendant high-octane requirements are used to give improved passenger car performance rather than improved economy, no justification exists for the production of gasolines to satisfy the antiknock requirements of such cars. The automotive industry must recognize that the primary obligation to society is to provide adequate transportation at reasonable cost and with maximum conservation of national resources."

Two Economy Methods

Holaday said there are two routes by which the automotive and refining industries can achieve the goal of maximum fuel economy with high compression ratio engines.

The first is by limited production of such cars, which would mean that less premium gasoline would be produced but it would have a higher octane number. Only the new cars would then operate on premium gasoline and the balance would use regular grade of current quality. He estimated that about 20 per cent of the motor fuel would be premium with a Research rating of 97 with 2 ml TEL per gallon, and 80 per cent would be regular with a Research rating of about 83 with 2 ml TEL per gallon.

The second route, Holaday said, achieves the objective of fuel economy and petroleum resource conservation much more rapidly. It is based on what he called "mechanical octane numbers," meaning a device by which a car gets the advantages of premium fuel only at the times it requires them and runs on regular grade the other 95 per cent of the time. He listed a number of such possible devices which he said automotive engineers should develop with the objective of promoting economy in fuel consumption.

No Super Fuel

Holaday ruled out the possibility of a third grade, or "super premium," gasoline as requiring too heavy an investment in pumps, lines, and tankage.

Looking to the future, he anticipated a decrease in quantity but an increase in quality of premium fuel, suggesting that by 1952 premium gasoline might be 25 per cent of the total but its Research octane number would increase from the present 88 to 97, while the balance would be regular grade with a Research octane number not over 84.

To the small refiner, Holaday said, this trend would indicate a need for refining facilities to produce gasolines of high sensitivity and high Research octane number.

Synthetic Fuels Discussed

The current interest in synthetic fuels was reflected in the fact that two papers were devoted to this subject. R. W. Krebs of Esso Laboratories, Baton Rouge, discussed applications of the fluid catalyst technique to catalytic cracking and hydrocarbon synthesis. R. C. Alden and Alfred Clark of Phillips Petroleum Co., Bartlesville, presented an appraisal of gas synthesis operations.

Krebs devoted most of his talk to a description of the fluidized technique and its possible application to a wide variety of chemical processes. He also described various processes used in fuels synthesis and illustrated the advantages offered by fluidization over the original German processes, particularly in simplification of equipment and removal of the high heat of reaction.

Both Krebs and the two Phillips men reported that the liquid product of a gas-synthesis plant will be about 85 per cent motor gasoline with an A.S.T.M. motor rating of 80 octane and a Research octane number of about 92. Both also stressed the fact that water-soluble organic chemicals will be produced as byproducts, and while these will be a relatively small percentage of the liquid products of such plants they will have a very far-reaching effect on the chemical industry.

Chemical Output Huge

If the industry should construct 10 hydrocarbon synthesis plants with a daily production of 7,000 bbl. of liquid products per day, or about the same size as the two now under construction, the production of various alcohols, aldehydes, and related chemicals would be equal to two-thirds of the present United States production of these products, it was pointed out, and this would make the petroleum industry the major producer of organic chemicals.

A somewhat pessimistic note ran through the paper of Alden and Clark. Noting that the petroleum industry is probably devoting more research to fuels synthesis than was being spent on catalytic cracking 10 years ago, they declared that the oil industry can be expected to remain the chief supplier of liquid fuels regardless of the materials from which they are made in the future.

But they expressed the belief that crude petroleum will be the chief source for several times the 13-year period mentioned by some so there is no need for precipitous haste in constructing synthesis plants. They also pointed out that conversion of any fuel from its native state, solid, liquid, or gaseous, requires an expenditure of these very resources and therefore should be undertaken only when there is a compelling reason for using perhaps half the energy content to accomplish the conversion.

Since 50 per cent of the energy of natural gas is dissipated in converting it to liquid fuel, the authors concluded that natural gas cannot be regarded as a long-range source unless there is a tremendous increase in new discoveries and a drop in the rate of consumption for other purposes.

However, they said, present gas reserves will support synthesis operations up to several hundred thousand barrels per day provided the operation can compete economically with processing crude oil and can pay a price sufficiently high to stimulate new gas discoveries. As things stand, they said, with a marginal long-term profit prospect, with a very large investment requirement, and with most important gas reserves committed otherwise, it is quite likely new gas-synthesis operations will be undertaken slowly.

Changes in the design of automotive engines present constant problems for lubricating oil manufacturers, it was explained by C. J. Livingstone and W. A. Howe of Gulf Oil Corp., Pittsburgh, in a paper on "Im-

(Continued on page 139)

Next Week . . .

. . . The National Association of Corrosion Engineers conference will be covered both by Paul Reed's news account of the St. Louis meeting and Journal-Digests of the papers.

During the past 3 years Standard Oil Co. (Ohio) has been metering crude oil in a pipe-line installation. A report will be presented describing the equipment and outlining the operating procedure, plus data relative to costs and accuracy of measurements achieved.

Neil Williams of the Journal, from his field trip into western Canada, reports on drilling and development practices for Leduc which is rapidly becoming Canada's greatest oil reserve. Maps, field photos, drilling and production data are included.

Dr. Alexander Wolf, consulting physicist of Houston, presents a special article on "Use of Electrical Models in Study of Secondary-Recovery Projects."

"Maintenance of Orifice Meters" is covered by two instrument experts who include trouble-shooting hints and deal with maintenance problems.

Krug Scores Wherry, Hadlick in Dispute Over Lifting Connally Act

WASHINGTON. — Nothing in the states' administration of their conservation laws justifies suspension of the Connally "Hot Oil" Act, and such action would accomplish nothing toward relieving the supply situation, Interior Secretary J. A. Krug told the Senate small business oil subcommittee April 2.

Called by Chairman Kenneth S. Wherry to testify on the monopolistic effect of the law charged by Paul Hadlick, special counsel to the subcommittee, Krug went to the Capitol in a belligerent mood. He was visibly irritated over Hadlick's charges before the District of Columbia public-utilities commission the preceding day that last winter's oil shortage had been rigged and ample gasoline is available to permit the local streetcar company to substitute buses on some of its routes.

In view of the shortage stories which they have carried almost daily for several months, the Washington newspapers gave Hadlick big play, but when Krug took a slap at him and recalled Wherry's report last December that the oil situation was critical, Wherry remarked with a smile of satisfaction that at least it had given his subcommittee some publicity.

Bell Halts Debate

Wherry also irritated Krug by his insistence that suspension of the Connally Act would enable the recovery of 300,000 to 500,000 bbl. daily of West Texas oil, but what promised to be a heated interchange between the two was cut short by the bell calling the Senate into session, which necessitated suspension of the hearing.

So far as Wherry and Hadlick were concerned, they made it clear they are convinced that the inability of the states to meet all demands for their oil requires suspension of the Connally Act by the President.

They pointed out that Section 4 provides that whenever the President finds the amount of petroleum and products moving in interstate commerce is so limited as to be the cause, in whole or in part, of a lack of parity between supply and consumptive demand, he shall suspend the act, and they charged the states have consistently limited their allowables so as to put an upward pressure on prices and that the Bureau of Mines is helping them by its monthly forecasts, which are forecasts of supply rather than demand.

Krug explained that the sole purpose of the Connally Act is to support the state conservation laws, and told Wherry he did not "favor" any federal interjection into the field of conservation.

MER's Too High

It is the practically unanimous opinion that the state MER's, rather than being too low, are if anything too high in some areas, notably Louisiana, Mississippi and Arkansas, he declared, adding: "We see absolutely no reason for suspension of the Connally Act; on the contrary it is my very strong feeling that this is the time when the states need the federal support most because prices are so high the temptation to violate state regulations is at an extremely high point. There is evidence that pressure is resulting in greater violations than normal."

Krug agreed that if any state attempted to use the Connally Act to restrict production below MER, the President would have the right to suspend it, but denied anything like that is occurring and where wells are producing at their maximum efficient rate suspension would not help the situation.

Pressed to provide an estimate of what the actual consumptive demand might be, Krug disclosed that he has set the department to work on the figures and has asked the American Petroleum Institute to make a similar study, but insisted the figures would be nothing more than a "guess."

Oil Groups Ask Change In Taxation Methods

WASHINGTON.—Five oil associations joined this week in an appeal to the Bureau of Internal Revenue to reconsider a reported plan to require that geological and geophysical expenses be accounted for as capital charges and follow a policy giving oil operators the right to deduct as current expenses all amounts paid for geological and geophysical exploration.

In a brief filed by the Mid-Continent Oil and Gas Association, Western Oil and Gas Association, Rocky Mountain Oil and Gas Association, National Petroleum Association and Independent Petroleum Association of America, the bureau was told that neither the statute nor regulations specifically denominate these expenses as capital charges and the courts have never specifically ruled on this point.

It was pointed out that a ruling that these expenses must be capitalized for income tax purposes would be contrary to the established accounting practices of the industry. A field procedure ruling issued in 1942 called for capitalization of such expenses in certain cases, and has been applied with progressively increasing severity, but no sound foundation has been laid for the proposed ruling, through decisions of the tax court or otherwise, it was declared.

Steel Estimates Too High, Bruce Declares

WASHINGTON. — Steel requirements as estimated by the National Petroleum Council committee are, in some cases, beyond the capacity of the steel industry to produce and will have to be scaled down before they can be passed on to the metal industry by the Department of Commerce, David K. Bruce, assistant secretary of Commerce, declared April 5.

However, Bruce told the House interstate commerce committee, the industry's estimate that it will need 1,500,000 tons of steel in the shape of oil-country tubular goods, plus some 250,000 tons for export, is not far in excess of the expected production of 1,600,000 tons and exploration and development needs probably will be met in substantial degree.

The estimates include items not ordinarily included in figures on steel shipments to the oil industry, such as containers, tankers, tank cars, and barges, he told the committee, but a study of figures that can be compared with past deliveries indicates the industry is asking almost 8,000,000 tons for 1948, compared with 3,700,000 tons delivered last year.

While there is hope that requirements for oil-country goods can be met, figures submitted by Bruce indicated that the NPC estimate of 3,400,000 tons of line pipe is 25 per cent above the planned production, while its call for more than 900,000 tons for containers, twice the amount received last year, could be met only by diverting steel from other industries or by making a larger share of container steel available to the oil industry.

The estimate for 900 tank cars a month is double the output provided for in the voluntary agreement made by the steel industry last week. The requirements for tankers will require detailed study, as will the estimate of exports of casing and line pipe, which are figured at a level 88 per cent over shipments in 1947.

Bruce explained that the report has not been finally approved by the council, and is now being analyzed in the Interior Department.

this week

INTERNATIONAL—United States oil industry officials predict pending bill in Brazilian Congress will fail to move U. S. companies to exploration and development in Brazil. . . . ¶Two Socony-Vacuum refineries in France and one in Italy reported back in operation. . . . ¶Australia's new asphalt plant at Sydney awaits first cargo of crude oil. . . . First shipment scheduled to leave Bahrein Island this month. . . . ¶Results of Cities Service's negotiations for drilling operations in Mexico expected to be announced soon. . . . ¶Argentina's 1947 crude-oil production reported at approximately 59,000 bbl. daily, a 5 per cent increase over 1946 output. . . .

DEMAND—Revised Bureau of Mines 1948 demand forecast sets refinery runs at 5,490,000 bbl. daily. . . . Predicts an increase in total domestic demand of 7.3 per cent over 1947. . . . ¶Demand for refined products "will tax the capacity and ingenuity of our industry after satisfying governmental requirements," H. T. Ashton, president of the W.P.R.A., declared at association's annual meeting, April 6. . . . ¶Armed Services Petroleum Board says oil products requirements for 1949 from the United States and Caribbean area will total 92,229,000 bbl. . . . Military estimates for aviation gasoline and jet fuel raised nearly 3,000,000 bbl. . . . Committee report shows total requirements scaled down from 117,040,000 to 115,129,000 bbl. . . .

PIPE LINES—Oklahoma Natural Gas Co. authorizes construction of approximately 148 miles of lines in Oklahoma. . . . ¶Rocky Mountain Pipe Line Co. contracts laying of 148 miles of crude lines in Colorado and Wyoming. . . . ¶Pan American Gas Co. begins construction on 20-mile, 16-in. gas line from Chocolate Bayou field of Brazoria County, Texas, to Texas City. . . .

NATURAL GAS—Dominion Natural Gas Co. will begin construction immediately on a $2,000,000 oil-gas plant at Port Stanley, Ont. . . . ¶FPC suspends rate schedule of United Gas Pipe Line Co., pending hearing. . . . ¶Arkansas Natural Gas Corp. will dispose of its interest in gas distribution system of Arkansas-Louisiana Gas Co. as ordered by SEC. . . .

SYNTHETICS—Bill prepared by Rep. Charles A. Wolverton would defer government construction of plants, provide that Reconstruction Finance Corp. might make 30-year loans to encourage industry to carry out program. . . . ¶Effect of hydrocarbon synthesis on chemicals industry cited before W.P.R.A. by speakers. . . . Two plants now under construction will account for two-thirds of current water-soluble, organic-chemicals output. . . .

TRENDS—Rate of well completions since January 1 averaging 13.7 per cent above completions in same period last year, bearing out Journal prediction of 36,600 total for 1948. . . . Journal forecast predicted 10.6 per cent over-all increase over 1947, but slight drop expected in Summer months. . . . Wildcat completions averaging 15.8 per cent above same period in 1947, compared with Journal forecast of 15.3 per cent gain. . . . Figures given through week ended April 3. . . . ¶Runs to stills for 13-week period ended March 27 average 5,394,000 bbl. daily, a level 594,000 bbl. daily above the 4,800,000-bbl. average during same period in 1947. . . . Of total increase, Texas and Louisiana Gulf areas responsible for 290,000 bbl. . . . Increase mostly provided through rearrangement of operations, rather than new construction. . . .

Typical of the job pipe-liners face in April, muddiest month of the year, is this view of operations on the Texas-West Virginia line near Shaw, Miss. Morrison Brothers Construction Co., Odessa, Tex., is contractor for Tennessee Gas Transmission Co. The crew is using the stovepipe method of laying the 26-in. line. The two Lincoln welders, together with their equipment, have been virtually floated into position

New Bill Would Defer Government Synthetics Program, Permit Loans

WASHINGTON. — New synthetic-fuels legislation, in which private industry would be given an opportunity to build plants and insured a profitable market for its product, has been prepared by Rep. Charles A. Wolverton of New Jersey, based on testimony taken during the House Interstate Commerce Committee hearings last month.

Copies of the bill have been distributed, with a request for comment, to members of the oil industry who testified on the original measure, which proposed that the Government build three commercial synthetic-fuels plants, and others whom the committee thought would be interested.

In the new measure, the construction of the government plants would be deferred for at least a year and then undertaken only if the Secretary of the Interior, after investigation, determined that facilities additional to those built by industry were necessary "to furnish an adequate basis from which to develop a rapidly expandable and technologically advanced synthetic liquid-fuel industry." The Secretary would be directed to make such a study annually or, at his discretion, oftener.

Permits RFC Loans

To encourage industry to get into the synthetics field, the bill authorizes the Reconstruction Finance Corporation to make loans for periods as long as 30 years for the construction of synthetic plants.

Further, the RFC may provide financial inducements to assure synthetic-fuel plant operators of a fair and reasonable return by (1) buying the product, in such quantities and upon such terms and conditions as it deems necssary, for resale, even though it is expected sales will have to be made at a loss, or (2) make payments, or advance commitments for payments, to domestic producers, over a period not exceeding 10 years.

If the Secretary of the Interior in the future should determine the Government should construct plants, the RFC would be empowered to acquire real property therefor by purchase, lease, condemnation or otherwise; purchase, lease, build and expand plants; purchase and produce equipment, facilities and materials necessary for the production of synthetic fuels; and acquire technical data, inventions and patents or patent rights by purchase, license or donation.

In administering the legislation, the Secretary of the Interior and the RFC, jointly or separately, would establish one or more advisory committees consisting of representatives from the petroleum, coal and other affected industries.

The Secretary would be authorized to accept gifts, bequests or contributions of money and property for use in research on synthetic fuels, and to cooperate with any person, agency or organization, federal, state, or private. Provision also is made for suspension of the antitrust laws for actions held necessary by the Secretary, after consultation with the Attorney General, to carry out the purposes of the legislation.

Louisiana Lease Bids To Be Opened April 20

BATON ROUGE, La.—Bids are scheduled to be opened April 20 by Louisiana Mineral Board on lease offerings for more than 130,000 acres of state lands.

The land offered includes the beds of a number of lakes and streams and some coastal areas. Among the larger bodies of water whose bottoms are wholly or partially included in the lease offering are Maruepas, Concordia, Felicity, St. John, and Catahoula lakes. Parishes in which the land is located are: Terrebonne, Lafourche, St. Landry, St. Mary, Iberville, Concordia, LaSalle, East Baton Rouge, Plaquemines, Livingston, Tangipahoa, St. John, Caddo, Bienville, Bossier, and Red River.

Interior Funds Slashed By Appropriations Group

WASHINGTON.—A tough House appropriations committee last week criticized Secretary of the Interior J. A. Krug for earmarking $80,000 to set up a program staff in the department without its knowledge or approval, and penalized him by refusing to grant $20,000 to handle the oil industry's voluntary agreement.

It also slashed a request of $65,000 for expansion of the Oil and Gas Division to $25,000, explaining that during hearings the department advised that if the bill was not enacted into law until April 1 it would not be possible to recruit the right kind of staff on the basis of $65,000 and $45,000 would be the maximum required. But, said the committee, since the pending bill will not become law until considerably later than April 1, an even smaller sum will be sufficient.

A request of the Bureau of Mines for $312,000 to enable it to compile statistics on the mineral industries, including oil, for use in connection with the voluntary agreements was rejected flatly with the comment that since these statistics are of value to private industry, industry itself should collect or pay for them.

2,500 Expected for Joint Denver Meeting

Advance registrations indicate a probable 2,500 attendance for the joint convention of the three exploration scientific societies, American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists to be held in Denver April 26-29.

Registration begins on Monday, April 26, with the S.E.G. holding a technical session that afternoon, and a field trip arranged for members of the other societies. Monday evening there will be a joint session at which Senator Antonio J. Bermudez, general manager of Petroleos Mexicanos, government - owned oil corporation, will be one of the principal speakers.

Tuesday, Wednesday, and Thursday will be devoted to technical sessions, some of which will be joint meetings of all three societies.

Two separate post-convention field trips have been arranged. One will be a 2-day trip along the Front Range in the vicinity of Colorado Springs, Canon City, and the Royal Gorge. The other is a 3-day trip to Glenwood Springs, the oil-shale development at Rifle, and the Leadville mining district.

Lobby Act Registrations Spurred by Indictment

WASHINGTON.—Indictment by a District of Columbia grand jury of the United States Saving and Loan League for failure to register under the Lobbying Act has resulted in a rush by trade and other organizations to get their registrations on file before the April 10 deadline.

The expectation is that a number of oil associations which maintain Washington offices will file the necessary statements with the clerk of the House and secretary of the Senate in the next few days.

A number of individuals in the American Petroleum Institute, Independent Petroleum Association of America, and other organizations filed promptly after the law went into effect, but in general associations and trade organizations of all types appeared to be under the impression registration was not necessary.

There was some difference of opinion within the Department of Justice on that point, also, but finally a grand jury investigation was launched and an indictment secured.

First Exhibits for I. P. E. Hall of Science Arrive; Hundreds Planned

THE first of hundreds of scientific and technical exhibits began arriving in Tulsa this week for display in the Hall of Science during the International Petroleum Exposition, May 15-22.

The exhibits, gathered from production, refining, manufacturing, and technical centers throughout the United States, will illustrate, both to the layman and the technical man in each branch of the petroleum industry, the history and present scope of the industry.

Actual working models will be used almost exclusively, and exhibits will be arranged according to their natural sequence, according to Dr. B. B. Weatherby, vice president of Amerada Petroleum Corp., who is chairman of the I.P.E. scientific and technical committee.

Beginning with geological and geophysical exhibits, the tour through the Hall of Science will follow in order through drilling, production, transportation, refining, products transportation, marketing, and product-utilization exhibits.

Magnetometer to Be Shown

Among the exploration exhibits will be an airborne magnetometer, which will be operated to demonstrate its original use in locating enemy submarines during the war and its later adaptation to the search for oil. A radar exhibit also is planned, with a screen to be mounted atop the Hall of Science and the scope below for examination by visitors, together with explanation of its uses in supplanting surveying equipment in offshore exploratory work in the Gulf of Mexico.

Another outstanding exhibit will be a series of models illustrating the growth of salt domes in the Gulf Coast region during past geologic ages and showing the causes of their growth.

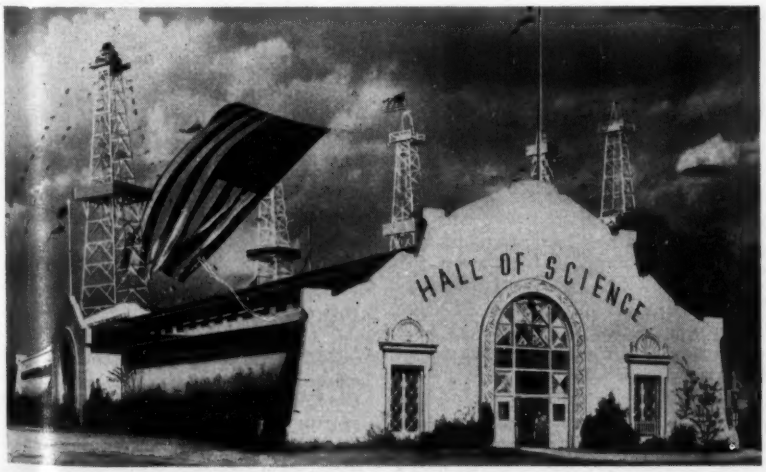
In the production division, one exhibit will demonstrate visually the effect of permeability of production. Gas will be injected under pressure into cores from about 20 of the country's major producing formations and allowed to escape at the bottom through water.

In the refining division, operating models will illustrate the principles of catalytic cracking and the operation of a hydrocarbon-synthesis plant and a synthetic-rubber plant. Additional models, Weatherby said, are planned to illustrate alkylation, light-ends recovery, solvent extraction, and Ethyl blending. Each of the refining models, he said, will actually perform, on a small scale, the operations carried out in life-size plants.

Transportation exhibits will include a small-scale pump station and a pipeline system in which glass tubes have been substituted at critical points to demonstrate the functioning of the system.

At one end of the 200 by 70-ft. building will be a small motion-picture theater in which about 30 of the nation's best motion pictures on petroleum will be shown.

More than 100 sound movies, many of them in color, have been ordered from the long list offered the committee. These will be previewed and the best retained.



Exterior view of the Hall of Science building at the International Petroleum Exposition grounds in Tulsa

Military Oil Needs Scaled Down Slightly

WASHINGTON.—The Armed Services Petroleum Board will require 92,229,000 bbl. of oil products from the United States and Caribbean area during the 1949 fiscal year, and will secure 22,900,000 bbl. of gasoline, Navy diesel, and heavy fuel oil from the Persian Gulf, it was disclosed last week by the National Petroleum Council committee on military and government petroleum requirements.

The committee's latest report shows that the ASPB has reviewed its probable requirements and has scaled its estimate down from 117,040,000 to 115,129,000 bbl.

Apparently in anticipation of substantial increases in military forces, estimates for aviation gasoline and jet fuel have been raised by nearly 3,000,000 bbl. and for heavy fuel by some 4,760,000 bbl., while reductions of approximately 7,500,000 bbl. have been made in Navy diesel and nearly 3,000,000 bbl. in Navy special fuel oil; slight changes up or down were made in other categories as well.

The latest estimates will require from United States and Caribbean sources 25,750,000 bbl. of aviation gasoline, including 3,174,000 of jet fuel; 14,340,000 motor gasoline, 1,620,000 kerosine, 6,283,000 Navy diesel, 11,049,000 other diesel and burner oil, 17,417,000 Navy special and 15,762,000 other heavy fuel oil. From the Persian Gulf, the board plans to procure 2,000,000 bbl. of motor gasoline, 6,700,000 Navy diesel and 14,200,000 Navy special fuel oil.

A breakdown of the aviation gasoline requirements shows that 5,692,000 bbl. will be 115/145 octane, 14,485,000 100/130, 2,031,000 91/98 and 376,000 73/80.

Estimates by point of origin show that 35,715,000 bbl. of the total requirements is assigned to the West Coast, 6,537,000 to inland sources and 49,977,000 to Gulf-East Coast-Caribbean origins. The only specific figures given for the Caribbean, however, are 1,400,000 bbl. of Navy diesel and 5,400,000 Navy special fuel oil.

Humble Asks Permit to Drill in Laguna Madre

HOUSTON.—Humble Oil & Refining Co. has made application with the Army Engineers Office in Galveston for a permit to drill in Laguna Madre in State Tract 34 about 1 mile south of Flourbluff Point and about 12 miles southeast of Corpus Christi.

The well will be drilled from a timber-pile foundation structure with a barge at each end to carry pipe racks, mud tanks, and other equipment.

International

WORLD-WIDE OIL DEVELOPMENTS

Lack ot Crude Oil, Strikes Slow Operations of French Refineries

ALTHOUGH refining capacity of the French petroleum refining industry increased from 3,290,000 tons (67,600 bbl. daily) in 1946 to 7,000,000 tons (143,000 bbl. daily) in 1947, total output only reached 5,090,000 tons (104,600 bbl. daily) in 1947 as a result of lack of crude oil and strikes. In 1946 only 2,853,000 tons (58,800 bbl. daily) were produced, which was 87 per cent of capacity during that year.

These figures were released in Paris to Reuters. The Oil and Gas Journal's 1947 refinery capacity figures, however, show that France had a daily potential refining capacity of 193,000 bbl. daily. *(The Oil and Gas Journal, December 27, 1947, page 206.)*

Insufficient refinery output and restrictions on imports of petroleum products from dollar countries have caused a substantial decline in French stocks of fuel oils which, during the 7-month period, July 1947 to January 1948, declined from 360,000 tons (2,700,000 bbl.) to 80,000 tons (600,000 bbl.), according to reports reaching London.

Output of French refineries so far has been considerably below demand. Last July the French refineries produced 120,000 tons (900,000 bbl.) of motor fuel compared with the month's requirements of 190,000 tons (1,425,000 bbl.). Of the 190,000-ton demand, 160,000 tons was for France and 30,000 tons for French colonies. In July 200,000 tons of crude oil were imported from the sterling area.

During February 1948, French refineries approximated 115,000 tons (30,000 bbl. daily) of throughput. About 35,000 tons (262,500 bbl.) of products were imported, bringing supplies to 150,000 tons against an estimated demand of 127,000 tons.

The French Minister of Industrial Production has stated that the French oil situation probably will be eased within the next 18 months when larger imports will be shipped in from the Middle East.

French imports of petroleum and petroleum products for the first 2 months of this year dropped to about a third of the total for the last 2 months of 1947, according to official figures released in Paris. The largest drop was in crude oil. In contrast with the general trend, however, a slight rise was recorded in fuel-oil imports.

Total imports for the first 2 months of 1948 amounted to 368,605 metric tons of crude oil, compared with 1,381,285 tons in the last 2 months of 1947; 132,546 tons of fuel oil, compared with 116,411 tons; 21,762 tons of gasoline, compared with 26,562 tons; 7,031 tons of lubricating oils, compared with 11,009 tons; and 4,888 tons of gas oil, compared with 8,568 tons. A breakdown of the imports by products and countries is contained in the accompanying table.

FRENCH IMPORTS (IN METRIC TONS*)

	Crude oil	Fuel oil	Motor fuel	Lubricating oil	Gas oil
United States:					
January and February, 1948	47,180	3,541	8,110	6,786	3,104
November and December, 1947	137,104	4,952	9,968	10,581	2,958
Venezuela:					
January and February, 1948	64,754	22,508	298	81	....
November and December, 1947	732,353	27,320	2,248	....	....
West Indies:					
January and February, 1948	.....	18,145	....	....	....
November and December, 1947	.....	38,157	....	....	....
Arabia:					
January and February, 1948	56,800	22,173	5,136	....	777
November and December, 1947	95,560	5,520	6,855	....	2,621
Iraq:					
January and February, 1948	137,861	3,211	....	....	....
November and December, 1947	121,348	.....	....	....	....
Iran:					
January and February, 1948	14,235	25,993	1,275	....	831
November and December, 1947	125,015	9,166	1,006	....	....
Other Asiatic countries:					
January and February, 1948	47,775	35,357	71	....	175
November and December, 1947	169,905	28,090	662	....	2,968
United Kingdom:					
January and February, 1948	.....	.....	....	81	....
November and December, 1947	.....	.....	....	239	....

*A metric ton approximates 7.5 bbl.

Output in Argentina Shows Gain in 1947

Argentine crude-oil production for 1947 totaled 3,473,120 cu. m., or approximately 59,000 bbl. daily, an increase of 5 per cent over the 1946 output, according to official government figures released in Buenos Aires.

The increase of 165,899 cu. m., or approximately 2,900 bbl. daily was entirely from state-owned fields, from which 69.8 per cent of total production was derived.

Production from privately owned properties has been held down due to certain government restrictions which have discouraged incentive. However, President Juan Peron assured United States diplomats April 2 that he has the friendliest feelings toward American companies and that it has been a lack of foreign exchange rather than a lack of good will that has forced his government to impose certain restrictions. Presumably this situation will improve during the months immediately ahead.

Oil Treaty Signed

Switzerland and Russia signed a commercial treaty, late in March, providing for the exchange of Russian petroleum products for Swiss machinery, chemicals, and various other materials. Payments are to be made in Swiss francs or any other freely convertible currency.

Three Socony Refineries In Europe Reopened

SOCONY-VACUUM OIL CO., INC., refineries at Frontignan and Gravenchon, France, and at Naples, Italy, which were heavily damaged during the war, are now in partial operation, according to Socony-Vacuum's annual report for 1947.

Affiliated subsidiaries in Poland, Czechoslovakia and Yugoslavia have lost control of their properties through nationalization. Last year Russia seized a refinery at Lobau, Austria, in which Socony-Vacuum had a half interest.

Crude runs by European units operated by Socony-Vacuum affiliates averaged about 11,000 bbl. daily in 1947, as against 4,300 bbl. daily in 1946.

In foreign markets, the report stated, 1947 was characterized by sharply rising demand for petroleum products. Socony-Vacuum and other companies were unable to meet all requirements because of shortages of supply, principally due to inadequate refining capacity and tanker transportation.

Company operations of affiliated companies and branches in Great Britain, western Europe, Scandinavia, the Levant and West Africa were described as generally satisfactory. Company properties in Italy are expected to be returned shortly by the government. These properties were taken over in 1941. In Germany, the company affiliate is still operating under military control.

In the Western Hemisphere, Socony-Vacuum stated that continued growth and expansion is anticipated in the various Latin-American countries. Commenting on western Europe as a whole, the report said:

"For many reasons the prosperity of the nations of western Europe is vital to the economy of the world. . . . In our opinion further recovery depends on the prompt restoration of plant and working capital to enable these countries to resume an active part in international trade.

"Something in the nature of the Marshall plan would appear to be helpful in the accomplishment of this purpose, and if such a plan is implemented, western Europe should be well on its way to becoming economically self-sufficient. . . ."

United States Oil Men Cool Toward New Brazilian Bill

The Brazilian Congress may approve a pending bill, ostensibly designed to permit foreign capital to develop that country's petroleum, but oil-company officials in New York this week explained that the bill in its present form will not induce foreign companies to spend the necessary millions of dollars on exploratory and development activities.

This bill, the second draft of its kind, was drawn up largely as Brazil's military clique wished it to be. When told of the objectionable features of the first draft, President Eurico Gaspar Dutra called for a rewritten bill in order to make the entry of foreign oil capital more favorable. His wishes were not carried out. Consequently, it appears that still another bill will have to be written and passed by the Brazilian Congress before that country joins the rank of substantial oil producing areas.

Daily crude-oil production has never exceeded 400 bbl. in Brazil.

Australian Asphalt Plant To Use Bahrein Crude

CRUDE oil from Bahrein Island in the Persian Gulf will be used to start operations of the new asphalt plant at Sydney, Australia. The first cargo is scheduled to leave Bahrein this month. The plant, Bitumen and Oil Refineries (Australia), Ltd. (Boral), was built to process at least 50,000 tons annually, or approximately 1,000 bbl. daily. *(The Oil and Gas Journal, May 10, 1947, page 49.)*

California-Texas Oil Co., Ltd., owns 40 per cent of this company with the remaining 60 per cent being widely distributed among the Australian public. Crude charging stocks will be supplied from the Middle East by Caltex. Construction has been supervised by Caltex engineers on loan to Boral. Alden J. Herron, the refinery manager, has had 23 years of experience with Caltex affiliates in Texas and the Middle East.

By June the plant is expected to be in full operation. The asphalt plant is located on a 47-acre site adjacent to Bunnerong power station, and is convenient to road and rail facilities and to Botany Bay, the discharging point for tankers bringing the crude oil to the refinery. An extensive plant has been erected to handle packing and shipping of the asphalts. The drums will be placed six at a time on a pallet on a conveyor belt, and will be filled and weighed, and then loaded into rail cars or trucks for shipment. The plant facilities will include distillation equipment, vacuum reduction equipment for reducing the crude charge to desired viscosity, and air-blowing equipment to secure the desired ductility and to further assist in reaching the desired viscosity.

This will be the first asphalt plant in Australasia, and will manufacture a complete line of asphaltic products including road paving asphalts, roofing and industrial grades.

Results of Pemex-Cities Service Talks Awaited

DETAILS of Cities Service Co. negotiations with Petroleos Mexicanos (the Mexican Government oil monopoly) are expected to be announced shortly.

In the company's annual report, just released, it is stated that Cities Service is "engaged in negotiations for drilling operations in Mexico." This follows the March 18 announcement by Antonio J. Bermudez, Pemex director, that Pemex "hoped to have these arrangements concluded at a very early date." Furthermore, he stated:

"It is very satisfying to announce that arrangements for the indemnification to the Cities Service Oil group, for the properties they owned in the northeastern zone of Mexico, are on the verge of being made." *(The Oil and Gas Journal, March 8, 1947, page 41.)*

Bermudez also said that "we have discussed an agreement with Cities Service to have them help us in the exploration and development of areas they formerly owned."

It is believed that this negotiation will take the form of a loan of several million dollars by Cities Service to Pemex. Pemex it is reported, will use the loan to expand oil-industry operations and handle these activities themselves. Cities Service presumably will gain the right to purchase certain quantities of crude oil from Pemex, regardless of whether further Pemex drilling operations open up new oil wells.

Kellogg Gets Contract For Argentine Refinery

Kellogg Pan American Corp., a subsidiary of M. W. Kellogg Co., has been awarded the engineering contract by Yacimientos Petroliferos Fiscales (Argentine Government Oil Fields) for a 28,500-bbl.-daily refinery at La Plata. Indications are that Kellogg also will build the plant, with construction to get under way as soon as materials are available.

Other YPF refineries, which Kellogg probably will design and construct in Argentina, include a 9,430-bbl.-daily plant at San Lorenzo and a 6,285-bbl.-daily plant at Lujan de Cuyo. The La Plata refinery will include a fluid catalytic cracking unit and will cost approximately $31,250,000.

Mountain Provides Operating Clues for Huge Limestone Field

by H. S. Gibson

THE mechanism of oil recovery from sand fields, and the production-control methods employed, have been frequently described, but very little has been published on the mechanism and control methods of limestone reservoirs.

The first field discovered in Iran was Masjid-i-Sulaiman, which began producing in 1911, and to date has produced just over 120,000,000 tons (924,000,000 bbl.) of crude, which makes it the fourth largest single field in the world, the three larger being East Texas, Lagunillas in Venezuela, and Baku in Russia.

Masjid-i-Sulaiman is still producing about 3,750,000 tons (29,000,000 bbl.) per year, and although a total of 229 wells have been drilled, the greatest number ever used for production at one time was 31. Observations from the many shut-in wells gave experience used elsewhere in Iran, notably the Haft Kel field which has produced more than 100,000,000 tons (770,000,000 bbl.) with only 42 wells drilled and no more than 18 in production at one time.

The reservoir rock of the oil fields of Southwestern Iran is a marine fissured limestone named after Asmari Mountain where it outcrops a few miles away from Masjid-i-Sulaiman as a typical whale-back structure.

The mountain is very similar in shape and size to the M-I-S reservoir, and provides a full-scale model which can be examined at leisure. Study of the formation in this mountain, particularly the tiny fissures in the limestone, has provided many clues to the behavior of the oil, gas, and water in the nearby reservoir.

The limestone is Upper Oligocene to Lower Miocene in age, and is about 1,000 ft. thick. When a well drills into the rock, no production whatever is obtained until a fissure is penetrated, no matter how richly oil-bearing the cuttings appear to be. The individual capacities of the wells range from 500 to 2,000 tons (3,850 to 15,400 bbl.) per day.

From 1918 onwards certain of the wells of high-rock elevation went to gas, showing a gas dome had formed and that there was a gas-oil level which was falling with production, later shown to be falling about 15 feet for each million tons (7,700,000 bbl.) of crude produced. By 1921 it was shown that the closed-in pressure of the first well drilled was affected by the opening and closing of wells 3 miles away, thus proving the extreme freedom of connection through the reservoir.

By 1924 it was established that the oil-water level at the edge of the field was not rising at the rate to be expected from the reservoir being in free connection with an internal water table; in fact for over 2 years there was no definite indication of any rise at all. This was, of course, a great discovery, and showed that the crude-oil reserves were very considerable.

Nature provided this "scale model" of the Masjid-i-Sulaiman oil field in nearby Asmari Mountain in Southwestern Iran. Engineers of Anglo-Iranian Oil Co., Ltd., discovered that the mountain is the same size and shape as the underground reservoir, and from its formation and fissures they obtained important clues to control of production

Various samples of limestone obtained from the wells were found to have porosities varying from 8 to 12 per cent, but their permeabilities were found to be very low. Although these samples of porous limestone contained appreciable quantities of crude, it was generally accepted that the production of the field was not dependent on the porosity of the limestone, but came from pores, channels, and fissures of another order of size.

All the wells which had gone to gas or showed signs of doing so had been shut in. The value of gas conservation was fully appreciated, and no oil was drawn from any well producing gas in excess of that held in solution in the oil at the bottom of the casing, with the result that the gas-dome pressure was falling by less than 2 psi. per annum.

Seen as 'Closed Tank'

As there was still no sign of edge-water encroachment, the reservoir had come to be regarded as a closed tank from which crude could be drawn at any desired rate, so freely did the wells flow and so slightly did their producing rates decline. A drilling program was bringing in new producing wells at the rate of 15 to 20 a year.

Then in August 1927 a very serious occurrence took place. Well 56 on the southwest flank began to produce salt water, although the bottom of the well was some 200 ft. above the estimated oil-water level. Tests soon showed that the rise of water was very local, for water observation wells on either side, one 2 miles away and the other 1¼, showed no change of oil-water level either up or down.

The pressure in the vicinity of Well 56 was nearly 40 psi. lower than in the producing area in the middle of the southwest flank, and 65 psi. lower than on the opposite flank. It was immediately realized that this pressure difference was the cause of the water entering the well, and production from the area was at once closed down.

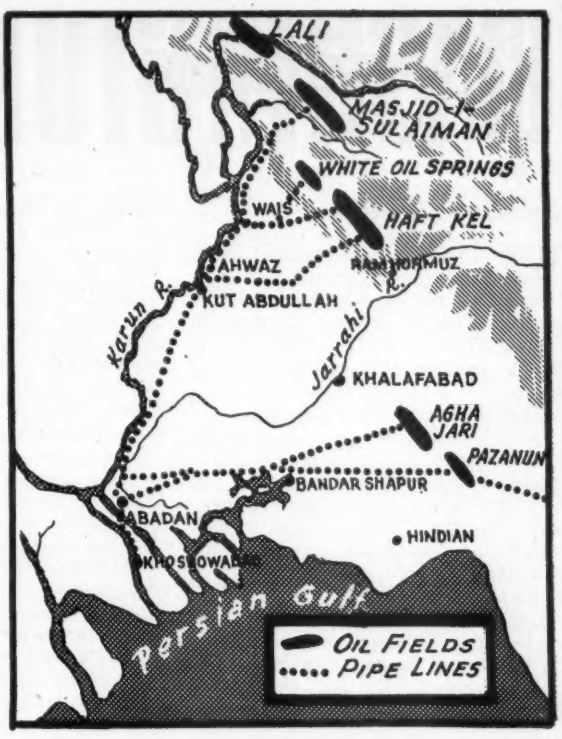
At the same time it was apparent that connection was not as free throughout the reservoir as had been supposed, otherwise a reduction in pressure in one section of the field such as had occurred would not have been possible.

In order to avoid similar occurrences in the future it was decided that the reservoir would have to be treated as a unit and a uniform pressure maintained in all sectors, the argument being that under a uniform pressure the oil-water level would be uniform. Off-take therefore would also have to be so dis-

Reservoir-control methods by which a limestone field has been maintained as one of the world's greatest producers for more than 30 years are here described by the man who has had most to do with the operation in the first authoritative and detailed description of the unique Masjid-i-Sulaiman field in Iran.

H. S. Gibson, a Fellow of the Order of Commander of the British Empire, is general fields manager of Anglo-Iranian Oil Co., Ltd., and one of the leading British petroleum engineers.

This article, presented in two installments, is a condensation and abridgement, with the consent of the author, of the paper he presented before the British Institute of Petroleum in March on the occasion of his being awarded the Institute's Redwood Medal for outstanding work in petroleum technology, which event was pictured in The Oil and Gas Journal, April 1, page 105.



Location of M-I-S and other limestone fields of Southwestern Iran where reservoir-control methods have prolonged the life of some of the most productive wells in the world in spite of the low permeability of the structures

tributed that the fall in pressure due to production must be uniform over the whole field.

It was concluded that the reservoir was divided more or less effectively into sectors or compartments round the perimeter inside which the connection between wells was so good that they were self-balancing, and it did not matter from which well, or wells, production was drawn. The next step was to balance up the field and find out what proportion of the total production could be drawn from each compartment to give a uniform pressure drop in the oil zone throughout the reservoir. It soon became obvious that the field is far from being uniformly productive.

Well 56, which had produced water, continued to do so for the next 8 months, but after 9 months was water-free and within 14 months was back on continuous production with no trace of water. The oil-water level in that sector returned to its normal position and has remained normal ever since.

The result of that experience was that the use of observation wells and the system of control by uniform pressure drop over the whole field became firmly established.

It had become increasingly obvious that production was obtained only if a fissure was penetrated. Sometimes a well would drill only 2 or 3 ft. into the limestone before obtaining a large production; at other times 300 ft. or more of limestone would be drilled without any sign of production, and then suddenly the well would be a producer.

Although it was felt that all the oil produced came from fissures, the possibility of production coming from porous limestone was never entirely ruled out, so in 1930 an extensive investigation of the reservoir rock was undertaken. The conclusions reached by this investigation were that while the limestone was to some extent porous and permeable, production was not dependent on porous or cavernous limestone, but on open fractures, and that production depending on the permeability of porous limestone under reservoir conditions was so low as to be entirely negligible.

About a year later, however, an incident occurred which threw considerable doubt on the above conclusion, and reopened the whole question of the possibility of production from porous limestone.

Well 245, the last one drilled to complete the balanced take-off from the field, showed a sharp drop in the gas-oil level within a few days. It was closed, and within a month the gas-oil level was completely restored.

The well was brought on to production very slowly, and it was found that an off-take of 150 tons (1,155 bbl.) per day kept the pressure of that zone in equilibrium with the remainder of the reservoir. At this rate the fall of gas-oil level was approximately one-fifth of a foot a day, instead of 8 ft. per day for the initial production rate of 330 tons.

This difference could only mean that the well was supplied with oil from a fissure, the fissure was replenished from porous limestone, the rate of flow from which was limited.

It has already been noticed that when the take-off of oil from the field was suddenly increased, there was a tendency for the gas-oil level to fall more rapidly for a short period, and, conversely, when suddenly reduced, for the rate of fall to decrease for a time.

It now began to look as though this effect might be due to some of the oil coming from porous limestone, in spite of the fact that all the samples of rock examined had appeared so compact and had such a low permeability that it did not appear possible.

A line of attack on the problem was suggested by a visit to Asmari Mountain.

On the mountain, two facts were very obvious, first, the infrequency of fissuring over a great part of the mountain, and secondly, the very small width of all the fissures found.

These two points together suggested that the total space available in fissures for the storage of oil in the Masjid-i-Sulaiman reservoir was quite small. It was later proved that the fissures range from about one-fiftieth to one-fifth of an inch in width.

(The remainder of Gibson's paper, which will appear in The Oil and Gas Journal next week, tells how experiments with an "artificial fissure machine" and tests on the rock itself showed that the bulk of the production actually comes from limestone of extremely low permeability — something considered impossible when the field was first developed.

As a result of this "visit to the mountain" and subsequent discoveries, Anglo-Iranian has been able to adjust the combination of water drive and dissolved gas drive in such a way as to insure long lives for the limestone fields of Iran).

WASHINGTON WATCHING

BY BERTRAM F. LINZ

Gas-Line Slowdown

WASHINGTON.—Natural-gas interests are deeply concerned over what they see as a new philosophy of the Federal Power Commission which would have the effect of virtually halting the construction of large, new pipe-line systems.

This threat, they say, lies in recent expressions that two provisions which are contained in most of the contracts made for the purchase of natural gas from producers render them ineffective as the "firm commitments" which the commission demands applicants for construction of new lines must have.

One of these provisions is the escape clause under which a contract would be terminated in the event the commission should hold that, by supplying gas to the interstate pipe line, a producer became subject to FPC authority.

The other, and far more important, is a clause calling for renegotiation of the agreement at the end of a stated period, with a view to adjusting the price if changes in market conditions warrant.

Members of the commission take the position that the inclusion of the renegotiation provision nullifies the requirement of a firm commitment, pointing out that in the event the seller demanded a price which the pipe-line company could not pay the latter then would be without a source of supply.

Spokesmen for the industry have expressed the belief that this is a deliberate attempt on the part of the commission to prevent the building of new pipe-line systems, which is in line with the contention of Commissioners Claude L. Draper and Leland Olds that natural gas should be conserved for more valuable uses than as fuel.

Planned Chaos

A FAIR sample of what the oil industry would be in for should Henry A. Wallace by any chance be elected President was given in the House last week when Rep. Leo Isaacson of New York, "bitter end" follower of the ex-Republican, ex-Democrat, third-party candidate, sought to kill the European Recovery Program by a prohibition against the expenditure of any funds for the purchase of oil in the Middle East.

Isaacson, "whip" of the three-man Wallace minority in the House which consistently follows the "red line," offered an amendment to the ERP bill with an explanation it was designed to prevent billions of profit going to American oil companies. Ostensibly, his charges were that an "oil lobby" had killed the plan for partition of Palestine, but the House membership saw something more sinister on the expansion of the prohibition to British as well as American oil areas.

In a quick answer to a tirade by Isaacson against President Truman, ERP, and the oil industry, Rep. Donald L. Jackson of California declared that the amendment "cuts the throat of the United States," pointed out that enlargement of the military establishment is under consideration, and asked sarcastically: "Failing access to the oil, what will we put in the gas tanks of the planes, the tanks, and the ships—Coca Cola?"

Jackson denounced the New York member in no uncertain terms, asserting his attack on the recovery program was part "of the pattern of planned chaos" couched in "words which might have appeared in the Daily Worker or which might have been spoken through the propaganda pipe lines from Moscow," and a direct attack against the national interest and national defense of this country.

Isaacson made no effort to answer Jackson's charges.

The third member of the Wallace group is Rep. John A. Blatnik of Minnesota, from a district in which there is a strong traditionally radical strength.

Blatnik, of Yugoslav descent, went down the line with his associates in their condemnation of President Truman's Palestine policies, declaring: "Standard Oil and its friends in our State Department are perverting our foreign policy in favor of the vested oil interests in the Near East . . . They are willing to sacrifice our national honor at the altar of oil profits."

One Side, Animals

FISH and birds and animals are believed to be thumbing their noses at wildcatters as well as sportsmen in some pretty promising oil locations and pressure is being brought to bear on the fish and wildlife service of the Interior Department to do something about it.

At a time when the Government is urging that every possible oil prospect in the country be investigated, large acreages are prohibited to exploration as fish and wildlife refuges where the service traditionally has be unalterably opposed to human invasion.

The matter reportedly is being considered by Interior officials, who are being urged to throw those areas open under whatever regulations may be necessary to protect the Government's wild wards.

There is a very considerable acreage in the 271 areas set aside in this country, close to ten million acres, in fact, about one-third of which probably is largely covered by water since that is the acreage of the 201 migratory water-fowl refuges. Another 8,000,000 acres is tied up in 20 refuges and wild-life areas in Alaska, Hawaii and other possessions.

There are refuges of one sort or another in every state in the Union, and it is contended that many of them could stand investigation as possible sources of oil. It is argued these areas should be explored, if for no other reason than to give the Government an idea of what it may have in the way of a backlog in the event of an emergency.

In Peace, Too

THE National Security Resources Board may play an important part in the development of governmental peacetime oil policy as well as in planning the industrial and civilian mobilization in the event of war.

Although board officials are not emphasizing its peacetime work, they point out it is a permanent agency with the duty of determining and recommending to the President what is necessary to insure that at any time, in the event of an emergency, the United States is prepared for war.

Thus, it is explained, if the board finds that prospective oil supplies give signs of inadequacy it might recommend to the President that development of synthetic fuels be stepped up, that action be taken to encourage new discoveries in this country or that a program be undertaken to import oil.

Such recommendations could be made under the directive to the board to advise the President concerning "the relationship between potential supplies of, and potential requirements for, manpower, resources, and productive facilities in time of war."

The petroleum division of the board is working with the Oil and Gas Division, Armed Services Petroleum Board and other federal agencies having an interest in oil. Accordingly, it is in position to suggest

to interior and the military actions which they might take, and perhaps already has played some part in the consideration by those agencies of the synthetic fuel program, stockpiling of oil and other matters which recently have been discussed before congressional committees.

The division is headed by Capt. Thomas J. Kelly, who has served in the Navy for more than 30 years, and Wallace E. Pratt, outstanding petroleum geologist and former vice president of Standard Oil Co. (N. J.), is serving as petroleum consultant.

Kelly is a native of Coffeyville, Kans., and a graduate of the University of Pittsburgh, where he received his degree in petroleum engineering. From 1932 to 1935 he was assistant inspector in the Office of Naval Petroleum Reserves in California and more recently headed the naval planning commission in Turkey, spending 2 months in the Middle East, and later accompanied a Senate appropriations committee group through Europe and the Middle East.

Strippers' Plea Vain

STRIPPER-WELL operators have been agitating for a modification of the depletion allowance provisions of the revenue law, but there is slim possibility that any consideration will be given the subject in Congress this session.

While a measure to iron out some of the inequalities will probably be sent to the House floor by the ways and means committee this year, it will be confined to noncontroversial subjects, and the long-promised general revision which will put into one statute the changes which have accumulated through repeated amendment of the revenue code will be deferred until the next Congress.

The complaint of the stripper-well operators is that the limitation to 50 per cent of net income in application of the 27½ per cent depletion allowance acts as a brake when posted prices are low and production costs are high, as they were following the war, and it is urged that the limitation should be removed in the case of dying wells.

Any effort to write this into legislation, however, is bound to bring a strong reaction from the Treasury, which for years has been needling Congress to rewrite the depletion provision so as to limit the allowance to recovery cost and is strongly opposed to its grant in perpetuity.

As an offset to the situation pictured by the operators, suggestions have been made that the stripper-well owners join in unitization plans and secondary recovery programs, and the secondary recovery advisory committee of the Interstate Oil Compact Commission has initiated studies along that line.

Industry War Controls Being Readied Rapidly

WASHINGTON. — Legislation and executive orders necessary for the setting up of wartime production, price, and other control agencies is being prepared by the National Security Resources Board as rapidly as possible, it was disclosed last week by Chairman Arthur M. Hill.

Although in existence less than 4 months and not yet completely staffed, Hill said, the board has already dug into its job of preparing for war "whenever it might come—including the immediate future."

Among other things, he said, the board is making organizational charts of civilian wartime agencies, indicating their interrelationship in the light of experiences of the last war, with the objective of smoothing out the rough places and eliminating potential jurisdictional conflicts. Should another war occur, it is hoped that much of the authority exercised by some 36 separate agencies during World War II can be soundly coordinated.

Intensive studies also are under way in the field of fiscal and monetary policies.

The board already has arrived at conclusions on some of the requirements for national security. These include a strengthening of our armed forces through universal military training and reenactment of selective service; an increase of sources and stockpiles of critical and strategic materials and the direction of research and development activities toward the further discovery of substitutes; and encouragement in every way of new discoveries, in this country and this hemisphere, of new sources of petroleum, metals and minerals.

Revised Bureau of Mines Forecast Predicts 7.3 Per Cent Demand Increase

A NEW 1948 demand forecast, showing sharp upward revisions from the previous forecast issued last November, has been published by the Bureau of Mines.

The revised version predicted that refinery runs for the year would average 5,490,000 bbl. daily, an increase of 4.3 per cent from the earlier forecast and 8.5 per cent above the 1947 average.

It predicted also:

1. An increase in total domestic demand of 2.6 per cent compared with the previous forecast and 7.3 per cent over 1947.

2. Domestic demand increases, compared with 1947, of 7.6 per cent for motor fuel; 16.8 per cent for distillate fuel oil; 14.6 per cent for kerosine; and 6.5 per cent for miscellaneous products.

3. An increase, compared with the November forecast, of 4.9 per cent in imports and a drop of 6 per cent in exports.

Domestic demand in the continental United States, the report said, "has been forecast on the assumption that the requirements for all products will be met, with the possible exception of residual fuel oil."

Allowance in the forecast, it said, was made "for an increase of 38,000,000 bbl. in refined stocks, about 60 per cent of this increase to be in distillate fuel-oil stocks."

BUREAU OF MINES FORECAST—1948
UNITED STATES SUPPLY AND DEMAND—ALL OILS
(Thousands of barrels daily)

	First quarter	Second quarter	Third quarter	Fourth quarter	Year 1948
Production	5,736	5,868	5,902	5,913	5,855
Crude (demand)	5,340	5,459	5,489	5,500	5,447
Other	396	409	413	413	408
Imports	473	462	478	500	478
Crude	280	291	315	315	300
Refined	193	171	163	185	178
New supply	6,209	6,330	6,380	6,413	6,333
Stock changes	—121	+352	+326	—141	+104
Crude	...	...	...	...	...
Other oils	—121	+352	+326	—141	+104
Total demand	6,330	5,978	6,054	6,554	6,229
Motor fuel	2,094	2,549	2,641	2,467	2,438
Residual	1,582	1,390	1,337	1,506	1,452
Distillate	1,330	791	739	1,179	1,010
Kerosine	434	270	239	413	339
All other	890	978	1,098	989	989
Exports	308	407	445	369	382
Crude	104	132	141	103	120
Refined	204	275	304	266	262
Domestic demand	6,022	5,571	5,609	6,185	5,847
Motor fuel	2,022	2,450	2,533	2,359	2,342
Residual	1,560	1,363	1,305	1,478	1,426
Distillate	1,286	725	663	1,141	954
Kerosine	429	253	217	392	322
All other	725	780	891	815	803
Runs to stills	5,370	5,480	5,530	5,580	5,490

Contract for 8,000-Hp. Jet Engine With Low Fuel Consumption Let

NEW YORK.—Contract to develop and build an 8,000-hp. turbo-jet aircraft engine "with a spectacular low fuel consumption" has been awarded Wright Aeronautical Corp. by the U. S. Air Force.

The new engine is the XJ-37, first designed late in World War II by Nathan C. Price and the power-plant section of Lockheed.

The engine is designed to deliver a thrust of 50,000 lb. It is claimed the engine shows a fuel economy which is unheard-of among jet-type engines, which normally are short-ranged as compared to reciprocating-type engines of conventional design.

Its low fuel consumption is credited to a "high degree of thermal efficiency" by H. L. Hibbard, Lockheed chief engineer.

To Extend Range

About 800 miles is the maximum action radius of existing jet bombers, while the recently developed B-36 bomber, powered by four 2,500-hp. Cyclone reciprocating (piston) engines, can operate through a 3,700-mile radius. The new engine is expected to extend the jet plane's operating radius greatly.

Another outstanding development in aircraft engine efficiency is the combination by the Wright company of an exhaust turbine-type assembly with the conventional reciprocating-type serial engine into a unit called the Turbo-Cyclone 18 engine. In this unit the exhaust gases from the engine are conducted to a turbine and cause the turbine to rotate at high speeds, the developed power being applied to the crankshaft to add its effect to that of the propeller.

A reduction in fuel consumption as great as 20 per cent is obtained by this development, or will boost the maximum power output of a given engine by the same proportion, according to G. W. Vaughan, Wright president.

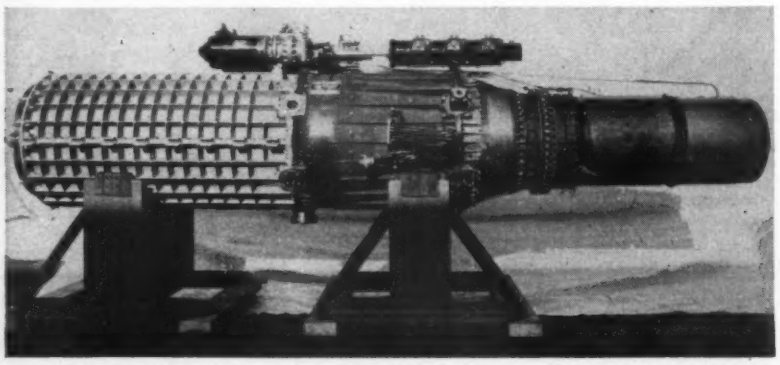
As an example, the long-range, nonstop record of 11,236 miles held by the Navy's Cyclone-powered Truculent Turtle, could be increased by about 15 per cent, or to 13,500 miles through use of the new development. The new engine combination is expected to enable commercial planes to cross the United States without refueling, which is not practicable with presently used power plants.

ERP Steel Imperils Oil Expansion, Brown Says

WASHINGTON.—Exports of steel under the European recovery program may prove "disastrous" to the oil industry's effort to secure materials for expansion of supply, Russell B. Brown, general counsel of the Independent Petroleum Association of America and chairman of the National Petroleum Council steel requirements committee, told the House interstate commerce committee, April 2.

Given the steel sought, he said, the industry will drill 37,600 wells this year and 38,300 in 1949; build 9,809 miles of oil pipe line and repair 1,525 miles neglected during the war; raise refining capacity to 6,633,000 bbl. daily by the end of 1950, permitting a throughput of 5,970,000 bbl. daily in the fourth quarter of that year; drill about 1,100 wells abroad, increasing output by about 370,000 bbl. daily, and provide the necessary marketing facilities to meet anticipated increases in demand. In addition, the estimates would enable the construction of 5,423 miles of interstate natural gas pipe lines, for which applications have been authorized by or are pending before the Federal Power Commission.

Brown declared the marketing estimates, particularly, were drafted with full recognition of the situation of the steel industry. "No steel is included which would result in greater demand for products presently in short supply," he said, "and it should be noted that this requirement does not include steel for competitive expansion."



Side view of the newly developed turbo-jet engine for which a contract has been awarded Wright Aeronautical Corp.

Southwest A.P.I. Schedules Ten Group Session Papers

Operating practices and problems in the Permian Basin and surrounding area will be highlighted at the group sessions scheduled for the second and third day of the meeting of the Southwestern district, American Petroleum Institute Division of Production, Plaza Hotel, San Antonio, April 14-15.

The 10 reports, which are scheduled on the preliminary program for the group sessions, include:

Thursday, April 15
2 p.m.

"Hydraulic Lift in the Permian Basin," E. B. Armstrong, Honolulu Oil Corp., Midland, Tex.; "Gas Lift in the Permian Basin," J. B. Harrell, Gulf Oil Corp., Odessa, Tex.; "Analysis of Unconsolidated or Loosely Consolidated Core Samples," S. H. Rockwood, Shell Oil Co., Inc., Oklahoma City; "Gas Repressuring in Texas," Roland Gouldy, Bridwell Oil Co., Wichita Falls, Tex.; and "New Type Porosimeter," Emil Kaye, Atlantic Refining Co., Dallas, Tex.

Friday, April 16
9:30 a.m.

"Industrial Relations," A. A. Nichoson, The Texas Co., New York; "The Relation of Nozzle Fluid Velocity to Rate of Penetration With Drag-Type Rotary Bits," J. P. Nolley, G. E. Cannon and Douglas Ragland, Humble Oil & Refining Co., Houston.

2 p.m.

"Drill Pipe Failures, Inspection and Protection in the Permian Basin," W. H. Crenshaw, American Inspection Service, Midland, Tex.; V. B. Bottoms, Superior Oil Co., Midland; C. N. Wallace, Western Plastic Co., Midland; and C. R. O'Dell, Tuboscope Co., Odessa, Tex.; "Offshore Drilling Development," D. A. McGee, Kerr-McGee Oil Industries, Inc., Oklahoma City; "Organized Fighting of Fires and Blowouts," Jack Kinley, M. M. Kinley Co., Houston; and C. P. Parsons, Spartan Tool & Service Co., Houston.

House Defeats Efforts to Modify Oil Sections, Passes ERP Bill

WASHINGTON.—Defeating all efforts to modify sections dealing with oil and oil equipment, the House last week passed the European Recovery Program bill and sent it to conference to iron out differences with the Senate.

Aside from an attempt to prohibit the purchase of oil from the Middle East made by Representative Leo Isaacson of New York, which was quickly and soundly defeated, efforts were made by Congressman John W. Heselton of Massachusetts and Oren Harris of Arkansas, members of the interstate commerce committee, to put into the bill some safeguards against shortages for the domestic consumers and American oil industry.

Heselton pointed to the investigations by his committee, which developed that shortages of fuel oil and gasoline may plague this country for some time to come, and joined Harris in urging that the program should not be permitted to build up competitive industry in the Marshall-Plan countries at the expense of our own.

Questions Raised

Harris raised six specific questions which he urged the chairman of the Foreign Affairs subcommittee to answer, but Rep. John M. Vorys of Ohio to whom he addressed them admitted he could not because of lack of definite information.

Harris wanted to know how the nearly $750,000,000 for petroleum equipment was to be spent, asking whether any money would be used for development in the Persian Gulf area and, if so, how much will be spent to develop the British-controlled fields; how much steel will be given for that purpose and how much will be purchased for the British pipe line to the Mediterranean; whether any steel will be purchased for the development of the British refineries in the Middle East, and how much steel will be used to develop the refinery capacity in participating countries.

In view of the shortage of steel in this country, Harris said, the plan for foreign development should be clarified and "we should give very careful consideration as to how much of the tubular goods, casing, and pipe line and so forth is going to be taken from domestic users and shipped to the Middle East to develop oil fields there."

Harris offered an amendment directing the administrator to refuse delivery from the United States to participating countries of any materials or money therefor for the development of oil resources unless the Secretary of Defense certifies such delivery is necessary and desirable in the interest of national security.

Monroney Opposes Change

Vorys said he had no objection to the amendment, which he felt was not necessary, but Rep. A. S. Mike Monroney of Oklahoma declared it would kill all chance of helping foreign development and told the House it was a question of exporting our own oil over long distances and further reducing our domestic supplies or letting the European countries have a little oil equipment to develop some of their own resources.

On a division, Harris' amendment was defeated by 14 to 59.

The foreign-aid program, as originally outlined, will be increased by more than $400,000,000 to take care of China. Under the legislation approximately 25,198,000 bbl. of oil and products estimated to cost $110,000,000 at January 1, 1948, prices, most of it to be obtained from Eastern Hemisphere sources, would be included.

Need for More Tankers Is Cited by Forrestal

WASHINGTON. — An increase in the tanker fleet sufficient to keep 22 tankers in constant service will be required for support of a program to expand the Air Force to 70 air groups, according to information submitted to the Senate armed services committee last week by Defense Secretary James V. Forrestal.

A preparedness program said to include a suggestion for the construction of something like 100 high-speed, high-capacity tankers is being worked on at a high level in the administration, and a number of proposals involving the stepping up of government oil activities, in Alaska among other places, have been submitted to the White House.

Louisiana Allowable Continues Increase

The Louisiana allowable for April has been set by the department of conservation at 516,755 bbl. daily, an increase of 2,990 bbl. daily over last month's allowable, and represents another in a series of consecutive monthly increases which began more than 2 years ago.

The Kansas crude-oil allowable remains at 290,000 bbl. daily for April, unchanged from the previous month.

Oklahoma's April allowable has been set at 405,000 bbl. daily, a 5,000-bbl. reduction from the March allowable. The April allowable includes 207,275 bbl. for allocated pools and 197,725 bbl. for unallocated areas.

Allowable production for New Mexico during April has been set at 135,000 bbl. daily, unchanged from the previous month.

Rubber Plants May Be Sold Under New Law

WASHINGTON.—Congress last week declared that the rubber security of this country can best be served by a free, competitive, synthetic-rubber industry but held that this is not an appropriate time for the Government to relinquish its war-built rubber plants.

Compromising differences between House and Senate, only a few hours before the Government's rubber-control authority expired, Congress sent to the White House a bill requiring the maintenance of facilities with a rated production capacity of 600,000 long tons of general-purpose and 65,000 long tons of special-purpose rubber, and specifying that there be manufactured and consumed in this country a minimum of 222,000 tons of synthetic a year.

To protect commercial producers of synthetic rubber, the measure provides that not all of the product for mandatory use need be produced in Government plants, but purchases may be made from private producers by the Government for resale, and in addition seeks to stimulate private industry by permitting the leasing of plants for the duration of the act, which will allow the production of synthetic for voluntary usage.

With a view to eventual disposition of the Government plants, a study is to be undertaken immediately to formulate a program for the sale or lease of the facilities which the bill requires to be maintained, and a report on the development of that program is to be submitted by April 1, 1949. Before January 15, 1950, the President, after consultation with the National Security Resources Board, must recommend disposal legislation.

The legislation permits the immediate disposition of plants not required to maintain the stand-by capacity of 665,000 tons. The facilities to be retained by the Government and not required for production for mandatory consumption are to be kept in stand-by condition and are to include at least one facility for making butadiene from alcohol.

PERSONALS

Compact's Director Has Wide Field Experience

ALBERT E. SWEENEY, JR., who recently was appointed director of the Interstate Oil Compact Commission's Secondary Recovery Division, has a background of 14 years in the oil industry with experience ranging from that of laborer to assistant professor of petroleum engineering at the University of Texas.

After graduating from the United States Naval Academy in 1934 he joined Phillips Petroleum Co. in the Breckenridge district. Beginning as laborer and roustabout he served in several capacities in the field in the gasoline division. In 1936 he was made gasoline plant operator. Later that same year he entered the graduate school in the petroleum engineering department at the University of Texas. A year later he was appointed an instructor in that department. While serving in this capacity he was employed by Phillips for one summer and by the Texas Railroad Commission for two summers.

In late 1940 Sweeney entered the infantry where he served as an intelligence officer, training officer, supply officer and commanding officer of various units before he was relieved from active duty.

At the time of Sweeney's return to the University of Texas in the latter part of 1945 he was appointed assistant professor of petroleum engineering. While still on the university's staff he was employed by Sharples Chemical Corp. for one summer and by Stanolind Oil & Gas Co. for one summer as research engineer.

Before joining the Interstate Compact Commission in his present capacity he was for several months with the Fairbanks Operators Committee as Fairbanks Field Engineer.

James L. Minahan, assistant petroleum engineer in the Holdenville, Okla., office of the Mid-Continent region, U. S. Geological Survey, has been assigned to the Northwestern region and will be stationed at Theromopolis, Wyo.

Cecil Hagen, consulting geologist, Houston, is making a 2-month tour of several South American countries. He will do geological work chiefly in Ecuador.

H. B. Chambers, operator of the Ben Franklin Refining Co. plant at Ardmore, Okla., has resigned to become plant superintendent of the Gratex Refining & Fuel Oil Co. plant at Graham, Tex.

Ed Rumsey, geologist, has been placed in charge of the recently opened offices of Zephyr Drilling Co. at Oklahoma City.

Ole Berg, Jr., formerly vice president and manager of the general sales for Union Oil Co. of California at Los Angeles, has been appointed vice president and assistant to the president of British American Oil Co., Ltd., Toronto. Berg began his oil career as a clerk in 1921 with Union Oil. In 1944 he became vice president and manager of general sales and directed all foreign operations as well as domestic matters. Berg was also a director and vice president of Union Oil Co. of Canada when that company was acquired by British American in 1945.

E. J. Yocom, formerly plant foreman at Stanolind Oil & Gas Co.'s plant at South Jennings, La., has been appointed plant superintendent there.

Gordon Duke, president of Southeastern de Mexico, has moved to Mexico City in order to devote his full time to this company. He resigned as board chairman of Southeastern Oil, Inc., the parent company. **Sigurd Scholle,** who has been connected with Southeastern for the past several years, has been elected a vice president and director and will be in charge of the company's New York office. Before joining Southeastern, Scholle was active in drilling operations in Oklahoma and Texas and did extensive research work on Latin-American oil matters.

J. S. ALLEN

Jack S. Allen, superintendent of Pure Oil Co.'s Smiths Bluff refinery, has been named manager of that plant, which is the largest of the company's refineries. Other changes which have been brought about as a result of the expansion of operations in the Smiths Bluff refinery are: **Irwin L. Hostetler,** assistant superintendent, to general superintendent; **Norman S. Bania** and **Robert F. Davies** to superintendent and assistant superintendent of light-oil operations, respectively; **Joe B. Price** to assistant superintendent of lube-oil operations; **Roland P. Wood,** to superintendent of construction and maintenance; **William G. Nelson,** to superintendent of maintenance; and **William E. Roden,** to assistant superintendent of maintenance.

Nelson V. Joyce, vice president in charge of the western department for Swan-Finch Oil Corp., has been named vice president in charge of purchasing for the company.

R. E. Callahan, who has been with the Sinclair companies for 25 years, and more recently as traveling auditor with headquarters in New York, has been made traffice manager of Sinclair Prairie Oil Co. and affiliated companies at Tulsa. Callahan succeeds **O. G. Pratt,** who recently retired.

E. L. Shafer, petroleum engineer for Continental Oil Co. at Hobbs, N. M., has been transferred to the Fort Worth office as engineer for the New Mexico Federal Unit. **R. L. Adams,** engineer for Continental at Big Spring, Tex., has been transferred to Hobbs to replace Shafer. **L. P. Brown,** field engineer for Continental at Big Spring, has been promoted to petroleum engineer.

Edward Falck, consulting engineer and during the war director of the Office of War Utilities, has been appointed principal consultant and advisor to Chairman **Arthur M. Hill** of the National Security Resources Board on matters pertaining to power, gas and water. Since leaving the Office of War Utilities, Falck has maintained his residence and office in Washington.

H. **N. Lyle,** formerly district engineer at Corpus Christi for Seaboard Oil Co., of Delaware, is now in the consulting business in Corpus Christi with Engineering Service Co., Inc.

Reuben F. Gray, office manager at Shell Oil Co., Inc., New Orleans, has been elected to membership in the Controllers Institute of America.

V. V. Thomasson, a superintendent for Barnsdall Oil Co., has been transferred from Marlow, Okla., to Shreveport, La.

H. N. Woodard, formerly division machinist at Laura, Ill., for Stanolind Pipe Line Co. and recently promoted to area master mechanic with headquarters at Humboldt, Kans., will act as staff assistant to the area superintendent, **C. A. Childers,** in the Kansas area. **Homer Stephens,** formerly division machinist at Carrollton, Mo., and recently promoted to area master mechanic with headquarters at Scottsbluff, Neb., will act as staff assistant to area superintendent, **W. S. Partner,** in the Nebraska area.

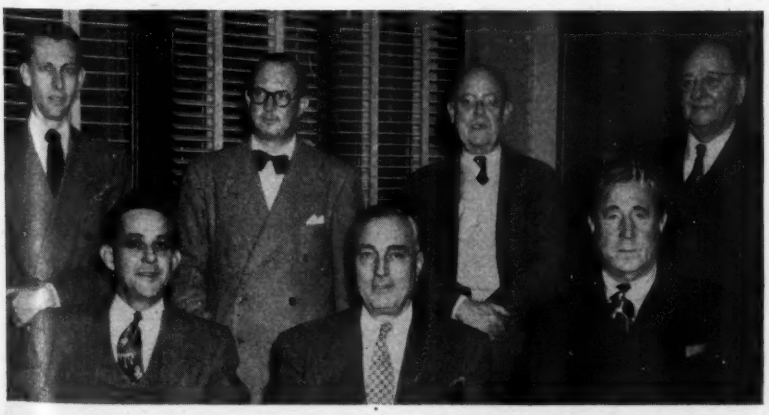
Bill Glasscock, formerly with Petroleum Products Co. in the San Juan basin area of Northwest New Mexico, has joined Republic Natural Gas Co. as district drilling superintendent at Midland, Tex. **Charles F. Wilson,** formerly with Gulf Oil Corp., has joined Republic at Midland as district landman.

William C. Boyle, formerly in charge of the Wichita office of Tide Water Associated Oil Co., has resigned to join the land department of Deep Rock Oil Corp. in Wichita. Tide Water has closed its office there, and business previously handled in Wichita will be under supervision of **J. N. McGirl,** head of the Kansas-Oklahoma exploration department at Tulsa.

E. H. Eacker, vice president of Boston Consolidated Gas Co., has been elected to the board of directors of the American Standards Association for a 3-year term.

Martin L. McGee, district landman for Vickers Petroleum Co., Inc., has opened a temporary office in Midland, Tex., for the company.

Robert A. Feagan, mechanical engineering group leader for Stanolind Oil & Gas Co., has been made process engineering supervisor in the manufacturing department, Tulsa general office. Other Stanolind promotions include: **D. W. Farnham,** mechanical engineering group leader, to project engineer; **W. J. Lang,** geological scout, Wichita Falls, Tex., to geologist in the Fort Worth office; **J. R. Foster,** seismograph party chief, to seismograph interpreter in the Fort Worth division office; **O. W. Anderson,** seismograph interpreter, Houston, to seismograph technician for special geophysical studies, Tulsa general office; **H. R. DeVinna,** computer, to assistant party chief in the Gulf Coast area; **Henry K. Boswell, Loren L. Buck, Ernest O. Patterson** and **Richard E. Pearson** to mechanical engineering group leaders; **L. O. Speer,** farm boss, to production foreman, Hendrick, Tex.; **P. D. Lenseig,** head roustabout, to farm boss, Hugoton, Kans. Recent transfers of Stanolind personnel include: **Alexander Clark, Jr.,** sales engineer, Houston to Tulsa; and **G. H. Lancaster,** petroleum engineer, Midwest, Wyo., to Rangely, Colo.



New officers of the Illinois Oil and Gas Association, elected at the third annual meeting of the group, are: Standing—John E. Miller, executive secretary; Edward T. Robinson, Smokey Oil Co., treasurer; T. B. Steele, Kewanee Oil Co., first vice president; and A. J. Rosenlieb, Ohio Oil Co., second vice president. Seated—Basil Moss, Magnolia Petroleum Co., third vice president; J. A. Matthews, independent producer, president; and H. C. O. Clarke, Pure Oil Co., secretary. More than 800 members attended the meeting, held March 22 in Mount Vernon, Ill.

George A. Weaver, Pure Oil Co. district geologist, has been transferred from Tyler, Tex., to Corpus Christi.

G. V. HOLTON

George V. Holton, formerly vice president and general counsel of Socony - Vacuum Oil Co., Inc., has been named chairman of the board, succeeding **Harold F. Sheets,** who retired after 41 years with the company. Holton left his law practice in Rochester, N. Y., to become assistant counsel for Vacuum Oil Co. in 1923. He was named a director of that company in 1931 and following the merger of Vacuum Oil and Standard Oil Co. of New York, became general counsel and a director of Socony-Vacuum. He was elected a vice president in 1938.

Ernest R. Lilley has been named general manager of the Tulsa offices of Great Lakes Carbon Corp. Great Lakes is preparing to open oil and gas production, accounting, and administrative offices there. **W. V. Phillips** will be assistant manager.

Sam S. Mabry, formerly assistant superintendent of the Great Bend, Kans., district for Shell Oil Co., Inc., has been made superintendent of that district. **W. M. Gholson,** formerly superintendent there, has been transferred to Healdton, Okla.

W. G. Nichols and **H. A. Stewart,** both from Kuwait Oil Co., Ltd., are in the United States for an indefinite stay. Nichols was formerly the materials superintendent for Anglo-Iranian Oil Co., Ltd., 50 per cent owner of Kuwait Oil. Gulf Exploration Co. owns the other 50 per cent. Stewart is a former field superintendent of Anglo-Iranian.

Comdr. George H. Schulz, USNR, vice president and treasurer of American Mineral Spirits Co., Chicago, has been named head of the recently formed U. S. Naval Reserve Volunteer Petroleum Division 9-1. The major purpose will be to provide an association of reserve petroleum personnel with experience in supply, transportation and distribution of petroleum products. The unit will also include U. S. Marine Corps reservists.

Worthington Angle Engine Compressors... FOR EFFICIENCY AND ECONOMY

10,000 hp... in this line of ten Worthington Type LTC-8 Angle Engine Compressors. These units, in gas processing service, were installed by Celanese Corporation of America, in their plant in the Corpus Christi area.

Brooks Hall, formerly a geological student at the University of Wichita, has joined the geological staff of Stanolind Oil Co.'s Wichita office.

Harry H. Hough, assistant purchasing agent for Amerada Petroleum Corp. in Tulsa, has been made purchasing agent for that company to succeed the late A. E. Cook.

Kye Trout, Jr., formerly production and reservoir engineer for Gulf Oil Corp. at Odessa, Tex., has joined the staff of the American Association of Oilwell Drilling Contractors at Dallas.

Paul G. Blazer, board chairman, Ashland Oil & Refining Co., has been reappointed to the board of the Cincinnati Bank of the Federal Reserve System for a 3-year term.

J. Chester Grey, Jr., has been named manager of the Anderson division of Central Indiana Gas Co. succeeding **H. Wayne Thornburg,** who will become director of public relations.

Howard B. Upton, who recently served in the Judge Advocate division in Japan, has been appointed director of industrial relations for the Western Petroleum Refiners Association. He succeeds **James T. Rasbury,** who has resigned effective April 15 to become director of employe relations with Sunray Oil Corp.

Herbert S. Chase, D. L. Hines and **Eugene F. McCabe,** all vice presidents of Tide Water Associated Oil Co.'s eastern division, have received 35-year service emblem buttons. Chase is in charge of manufacturing; Hines, transportation and supply; and McCabe, sales. **B. I. Graves,** vice president in charge of the eastern division, made the presentations.

L. H. Prichard, of Anderson-Prichard Oil Corp., was elected chairman of the board at their recent annual meeting. **Roland V. Rodman** was elected president; **T. H. Marshall,** vice president and treasurer; **L. H. Prichard, Jr., R. W. Brauchli, G. H. Burrus, C. H. Dresser, J. R. Lewallen, C. L. Mayhall** and **Weston Payne,** vice presidents; **Neale Boyd,** secretary and assistant treasurer; **S. A. Garrison** and **Roy Winters,** assistant secretaries and assistant treasurers.

SHIFTS—

Charles M. Tarr, engineer, Continental Oil Co., Long Beach to Whittier, Calif.; **George A. Colling,** foreman, Standard Oil Co. of California, Newhall to Ventura, Calif.; **H. J. Stewart,** engineer, Sunray Oil Corp., Santa Maria, Calif., to Alice, Tex.; **Norman A. Nelson,** engineer, Humble Oil & Refining Co., Thompsons to Lolita, Tex.; **Roy A. Baze,** engineer, Humble Oil & Refining Co., Jourdanton to Luling, Tex.; **S. T. Walker, Jr.,** engineer, Phillips Petroleum Co., New London, Tex., to Berwick, La.

J. Kenneth Myers, engineer, Union Oil Co. of California, Torrance to Los Angeles; **P. C. Barbour,** foreman, Gulf Research & Development Co., Rosenberg to Conroe, Tex.; **W. A. McFadden, Jr.,** geologist, Western Geophysical Co., Rockdale to Houston; **G. W. Fetter,** foreman, Gulf Oil Corp., White Deer to Dial, Tex.; **L. C. Pursel,** superintendent, Scott Drilling Co., Winters, Tex., to Elk City, Okla.; **S. H. Miley,** superintendent, Skelly Oil Co., Bay City to Refugio, Tex.; **W. P. Lawrence,** foreman, Amerada Petroleum Corp., Big Lake to San Angelo, Tex.

Clyde E. Davis, engineer, Gulf Oil Corp., Crane to Goldsmith, Tex.; **J. W. Moore,** engineer, Sinclair Rubber, Inc., Houston, Tex., to Louisiana, Mo.; **H. E. White,** superintendent, Shell Pipe Line Corp., Houston, Tex., to Healdton, Okla.; **C. H. Thurber,** engineer, Plymouth Oil Co., Laredo to Post, Tex.; **O. E. van Meter, Jr.,** engineer, Magnolia Petroleum Co., Midland to Houston, Tex.; **Alvin E. Hall,** engineer, Phillips Petroleum Co., Odessa, Tex., to Pawhuska, Okla.

M. H. Anderson, engineer, Phillips Petroleum Co., Phillips to Pampa, Tex.; **Peter F. Forness,** foreman, Stanolind Oil & Gas Co., Sundown to Wink, Tex.; **Benjamin R. Luscomb,** engineer, Stanolind Oil & Gas Co., Wink to Fort Worth, Tex.; **W. R. Montague,** superintendent, Sun Oil Co., Lafayette, La., to Beaumont, Tex.; **Howard R. Born,** geologist, Magnolia Petroleum Co., Shreveport, La., to Houston, Tex.; **Edward G. Dobrick,** geologist, California Co., Lexington to Versailles, Ky.

Roland F. Beers, geologist, Geotechnical Corp., Boston, Mass., to Troy, N. Y.; **R. Bruce Miller,** engineer, Ohio Oil Co., Findlay, Ohio, to Port Arthur, Tex.; **Robert E. Moyar,** engineer, International Petroleum Co., Ltd., Rouseville, Pa., to Toronto, Ont., Canada; **Elbert M. DeForest,** engineer, Spencer Chemical Co., Pittsburg, Kans., to Liberal, Mo.; **Garret Hoback,** engineer, Associated Refineries, Inc., Kalispell to Billings, Mont.; **J. J. August, foreman,** General Petroleum Corp., Casper to Worland, Wyo.; **J. P. Ellis,** foreman, Mid-Continent Pipe Line Co., Weleetka to Wewoka, Okla.

DEATHS

Lee Paul Hintz, 56, shipping manager for Hughes Tool Co., Houston, died April 1 in Houston.

Andrew Rasmussen, 65, retired engineer for E. I. du Pont de Nemours & Co., Inc., died April 1 in Perth Amboy, N. J.

Ray T. Roberts, 54, manager of Goulds Pumps, Inc., died April 5 in Tulsa. Formerly a Houston resident, Roberts moved to Tulsa in 1924.

Otto Emil Mentz, 57, superintendent for Emsco Derrick & Equipment Co., Houston, died March 27 in Houston.

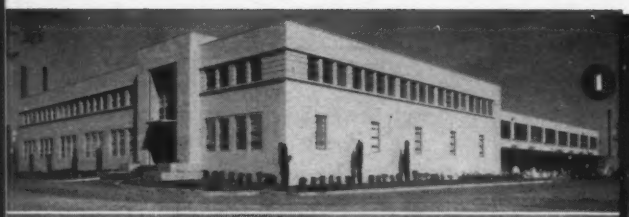
William Dewey Byler, Sr., 49, tool pusher for Allied Well Service, Inc., died March 23 in an automobile accident near Ellington field, south of Houston.

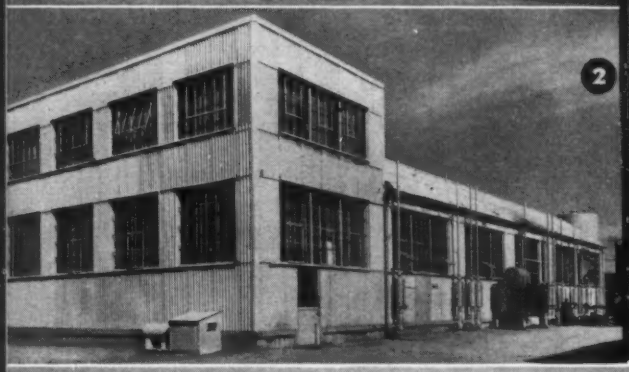
Ronald B. Crawford, 60, founder and president of State Fuel Supply Co., Oklahoma City, died March 28 in Dallas, Tex. Prior to establishing his own company, Crawford was affiliated with Wm. J. Crawford Oil Co., Pittsburgh, Pa.

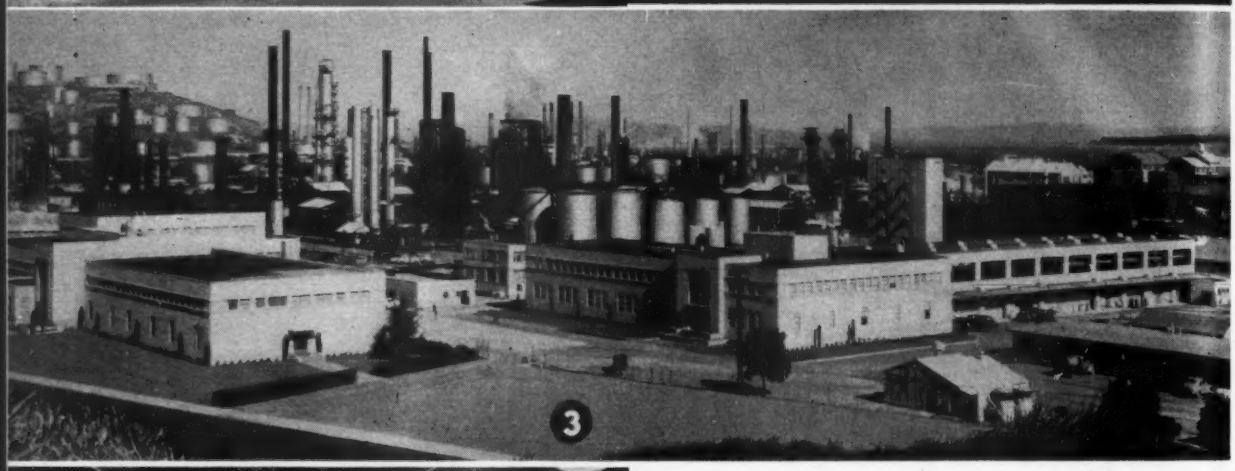
George Calvin Brous, 40, research chemist for Phillips Petroleum Co., died April 3 in Bartlesville, Okla.

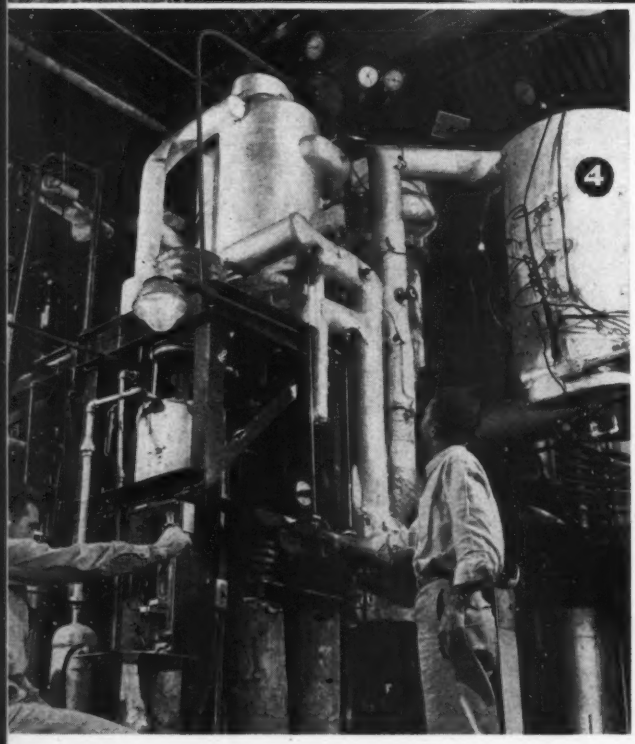
Norton H. Weber, 76, pioneer oil man, formerly vice president and director of Pure Oil Co., Chicago, died April 4 in Evanston, Ill. Weber, former president of the National Petroleum Association, had been in the oil industry for 61 years. He had been with Pure Oil Co. or predecessor companies since March 1, 1899.

Daniel J. Moran, 60, recently retired president of Continental Oil Co. and a well-known figure in the oil industry, died April 3 in Houston. He began his oil career with Buckeye Pipe Line Co. in the early part of the century. He later joined Texas Oil Co., predecessor of The Texas Co., as petroleum engineer. In 1921 he was made vice president and general manager of The Texas Co. of Mexico, and named manager of the producing department of the company in 1922. After 22 years with The Texas Co., Moran resigned to become president of Marland Oil Co., Ponca City, Okla., which in 1929 merged with Continental Oil Co.









by Herndon David

California District Editor

1—Process laboratory "A" houses a wide variety of facilities. These include a number of offices and laboratories; a cold-room section where temperatures may be kept as low as —50° F., and a machine shop. Extending 240 ft. behind the main section are two spacious laboratories for large-scale equipment and pilot plants

2—Engine laboratory "A" houses 16 full-scale engines used for testing lubricating oils and an overhaul shop for servicing engines

3—Panoramic view of newly completed $2,000,000 laboratory program of C.R.C. in Richmond, Calif., with Richmond refinery in background. The buildings are, left to right:

Research laboratory A, described above; research laboratory "C" (one-story building to rear of research laboratory "A") for industrial lubricant research; engine laboratory "A"; process laboratory "A"; and process laboratory "B" (seven-story structure in rear of process laboratory "A") for tall pilot-plant operations. Low buildings at extreme right are process laboratory units

4—Pilot plants such as this Houdry catalytic cracking unit can supply data required for designing a multimillion-dollar manufacturing system. The pilot plant, which is a complete refining unit in miniature, represents the final stage of process-research work

MORE than 2 million dollars have been spent during the postwar period in expanding and modernizing the Richmond laboratories of California Research Corp., a wholly owned subsidiary of Standard Oil Co. of California. The new laboratories are located in three separate areas adjacent to the parent company's Richmond, Calif., refinery. Some 80 individual laboratories and 125 separate offices are incorporated into the layout of 34 buildings.

The main building, a three-story structure which was erected in 1939, has been expanded to provide approximately twice the floor space available in the original building. Laboratories occupy the first floor of the building which is air conditioned throughout. The circulated air is maintained slightly alkyline to reduce corrosion to precision instruments housed on the main floor.

Accounting and clerical offices; technical files; and a library containing a large assortment of reference texts, United States and foreign patent specifications, pamphlets and bulletins, and various technical journals, are located on the second floor of the main building. Other facilities located on the second floor include management reception and conference rooms, a lunch room for women employes, and a central conference room.

Objectives of C.R.C. Research

California Research employs about 850 persons. Of these, approximately 675 are located at the Richmond laboratories. At Richmond, the search for new and improved products from petroleum and better ways of making them is carried on in three different categories:

1. Research (discovery of new ideas).

2. Development (improvement of existing ideas).

3. Technical service (technical assistance to refineries, oil-field operations, marketing, and customers).

Recent achievements.—Among the many projects actively worked on, the large number of "results" include these accomplishments, to list a few:

1. Development of lubricating oils specially compounded to withstand the severe operating conditions found in modern diesel and gasoline engines.

2. A novel method for making toluene for TNT from petroleum.

3. Development of more efficient processes for making 100-octane aviation gasoline.

4. Development of a new process for the manufacture of phthalic anhydride, an important ingredient in many paints and surface coatings.

5. Development of an important new detergent (sometimes referred to as "soapless soap"), which is superior to soap.

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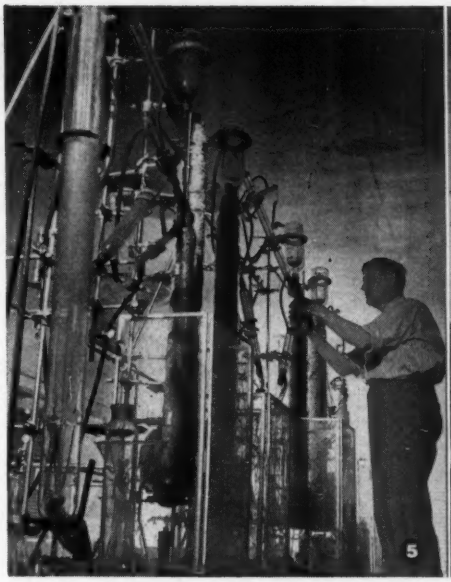
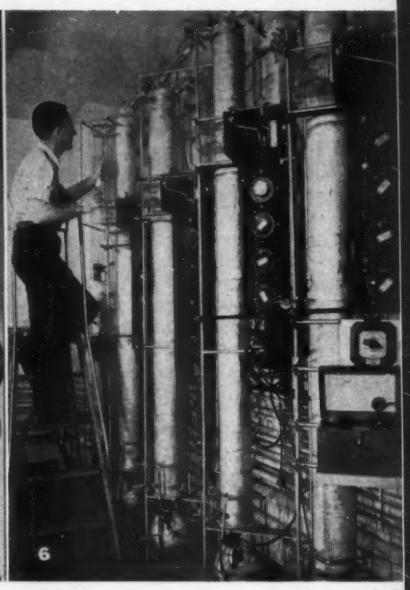


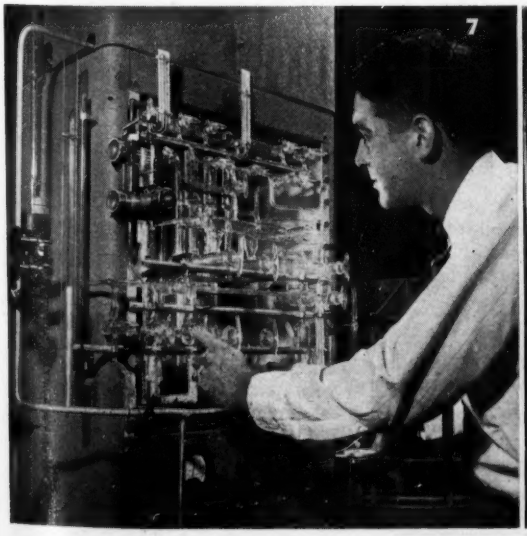


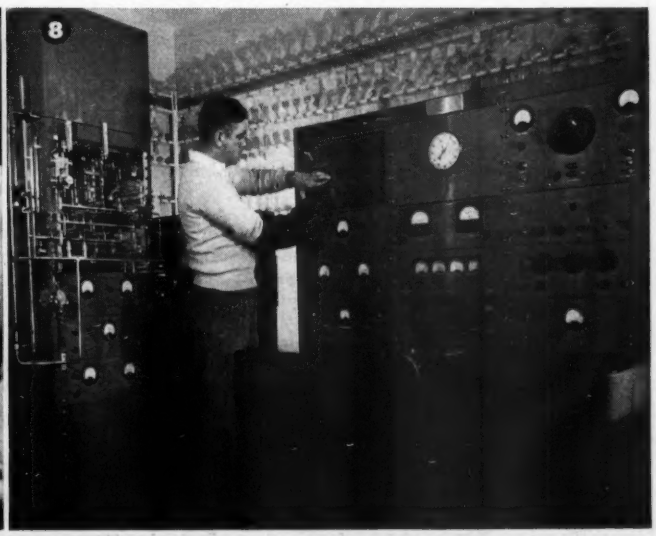
5—Distillation equipment like these glass columns is used in the first stages of process design. Columns separate oil into fractions that can be used for refining of gasolines, kerosine, and lubricating oils. Shown with equipment is R. G. Whitaker

6—These four columns are precision distillation equipment used in the development of new and improved chemical products from petroleum. The operator is Homer Wellman

7—First stage in the analysis of a petroleum product in the mass is the introduction of the sample. Adjustments of pressure and volume are being made by Harvey Norman

8—Norman now removes the photographic record from the mass spectrimeter indicating the complete composition of a sample petroleum product. This instrument, which costs in excess of $25,000, is the type used by the Government in the separation of Uranium 235





Preplanned Program With Royalty Owners Followed in Newest Unit Project

. . Gas Injection Expected to Double Recovery

by Leigh S. McCaslin, Jr.

ON April 1, Globe Oil & Refining Co. took over operation of the 67-well Southwest Antioch Gibson Sand Unit of Garvin County, Oklahoma, the third unit to be formed under Oklahoma's pioneering House Bill 339*. Although this unit is important from a conservation and many other standpoints, one fact is of special interest: The unit was formed without opposition from any of the approximately 200 royalty owners involved.

This lack of opposition is in striking contrast to the difficulties encountered with royalty interests in the formation of the West Edmond Hunton Lime Unit and the West Cement Medrano Sand Unit, the first two units to be organized under the provisions of H.B. 339. Opposition to unitization by royalty owners is not, of course, confined to Oklahoma. A certain amount of difficulty has been encountered in the majority of units formed in the United States, largely due to misunderstanding.

*House Bill 339 provides, if unitization is desired, that 50 per cent of the operators of a field can petition the Oklahoma Corporation Commission for such action. This body will hear the arguments for unitization and either grant or deny the request. If the request is granted, a 60-day period is provided during which the unit may be voided by the filing of protests by the lessees of 15 per cent of the area. If the order is not successfully protested, the law requires compulsory communization of all lease interests and all royalty interests, regardless of whether or not these interests approve of unitization.

Salient Facts—Southwest Antioch Gibson Sand Unit

67 wells
Area—2,680 acres
Spacing—40 acres per well
Average sand thickness—30 ft.
Average porosity—16 per cent
Average connate water—15 per cent
Original bottom-hole pressure—2,925 psi.
Original gas-oil ratio—1,165
Average bottom-hole pressure October 1947—2,450 psi.
Average gas-oil ratio September 1947—1,750
Present allowable — 7,350 bbl. daily
Cumulative pipe-line runs as of January 1, 1948—3,125,000 bbl.

BY-LAWS AND RULES OF PROCEDURE FOR THE SOUTHWEST ANTIOCH FIELD ROYALTY OWNERS' ASSOCIATION

PURPOSE

To provide a means whereby owners of royalty in the field may jointly consider and act on problems of mutual interest and, in particular, with owners of working interests in the field any proposals for more efficient oil and gas production practices.

MEMBERSHIP

Any owner of royalty under a tract within the developed area of the field, or under a tract offsetting a developed tract or tract on which drilling operations are in progress shall be eligible.

VOTING

Each owner shall have one vote for each 5 acres ownership of royalty or mineral interest or fraction thereof. A majority vote of the eligible voters attending any meeting shall be required to carry any question.

ORGANIZATION

The association shall elect from its membership, a chairman, a vice chairman, and a secretary-treasurer and shall elect five of its members —all as members of the Board of Directors.

FINANCING

There shall be no regular assessment for dues, except for such assessment as each at a duly called meeting voluntarily subscribe.

What then, has accounted for the complete lack of opposition to the formation of the Southwest Antioch unit? Oil-company officials attribute this phenomenon to the definite effort made by all concerned to keep the royalty owners completely informed as to all phases of the unit from its conception until its approval by the Oklahoma Corporation Commission.

. A specific and comprehensive program was followed in the matter of keeping the royalty interests informed. This program was started immediately after the operators in the field had conducted preliminary engineering studies and determined that benefits could be derived from a gas-injection project in the pool. This study showed that nearly twice as much oil could be recovered by gas injection as would be recovered by primary recovery methods. It also was found that to inject gas properly it would be necessary to unitize. The operators' first step was to name a committee headed by H. H. Kaveler, of Phillips Petroleum Co., which would fully inform the royalty owners of the situation.

Royalty Owners Meeting Called

This committee called a meeting of royalty owners to discuss "the general features of unit operation and to determine if a cooperative study of unit operation and its benefits can be developed between operators and the royalty owners." It was stated that: "The owners of working interests in the pool do not wish to proceed to the drawing of a proposed plan of unit operation until some arrangement can be made to have the royalty owners represented at all meetings and to have the royalty owners participate in all phases of development of the plan."

The meeting was attended by 65 royalty owners and operators' representatives. A committee of three royalty owners was appointed to arrange for a second meeting for the

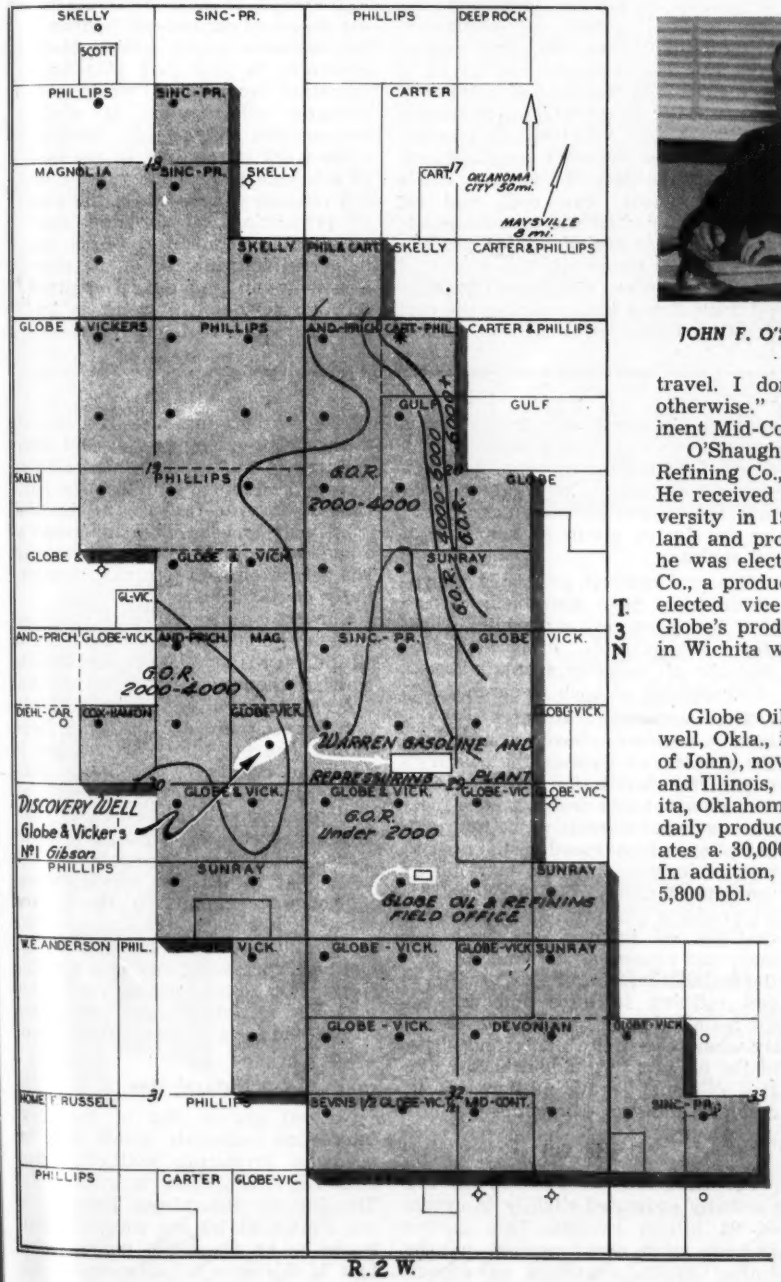
purpose of organizing a royalty-owners association. The latter meeting resulted in the formation of the Southwest Antioch Royalty Owners' Association. By-laws and rules of procedure were drawn up by the group (see accompanying box) and legal, geological, and engineering representatives appointed to meet with the operators to evolve a plan of cooperative study of unit operation.

Benefits Pointed Out

In the letters inviting royalty owners to participate in the association, an attempt was made to present clearly and concisely the benefits of unitization as far as the royalty owner was concerned. For example, the letter of invitation for the July 11 meeting stated: "Gas which is at present being used only to produce oil is being vented to the air upon reaching the surface. The object of unitizing the field is to prevent this waste of gas by returning it to the reservoir. It has been estimated that this practice will double the amount of oil recovered and in addition the gas which is now being vented will be saved and sold after all the oil has been recovered, resulting in a substantial increase in the revenue to royalty owners. The cost of unitizing which will include constructing a plant system for injecting gas into the reservoir will be entirely an expense of the operators."

Royalty owners unable to be present for the meetings were not forgotten. Such men as Don L. Raffety, division land manager, Globe Oil & Refining Co., Don Knowlton, consulting engineer, and O. B. Moody, Lindsay lawyer, personally visited these men and discused the proposed unitization with them. An attempt was made to discuss the proposition on a dollars-and-cents basis, with emphasis on the particular royalty owner's property. Among other things, it was pointed out to the royalty owner that under unitization he had an interest in the entire field, whereas before, his only interest was in his particular well or wells. This field interest, of course,

(Continued on page 90)



Gas injection is scheduled to start by May 1 in the Gibson sand zone of Southwest Antioch field. The shaded zone outlines the 67 wells included in the Southwest Antioch Gibson Sand Unit of which Globe Oil & Refining Co. is the operator. Contours indicate gas-oil-ratio status as determined by field tests taken in September 1947. Tom E. Ockershauser, Globe district engineer at Oklahoma City, is charged with preparing detailed engineering plans for the injection program

JOHN F. O'SHAUGHNESSY

The Unit Operator

"John F. O'Shaughnessy of Globe was the man who fathered the Southwest Antioch Gibson Sand Unit . . . in the face of a lot of discouraging developments he stuck with it for over a year—meetings, consultations, phone calls, travel. I don't believe it would have jelled out otherwise." (This statement was made by a prominent Mid-Continent secondary-recovery expert.)

O'Shaughnessy, vice president of Globe Oil & Refining Co., was born August 24, 1909, in Houston. He received an A.B. degree from Georgetown University in 1931. After graduation, he joined the land and production department of Globe. In 1936, he was elected vice president of Lario Oil & Gas Co., a producing affiliate of Globe. In 1942 he was elected vice president and general manager of Globe's production division. O'Shaughnessy resides in Wichita with his wife and six children.

Company Activities

Globe Oil & Refining Co., organized in Blackwell, Okla., in 1917 by I. A. O'Shaughnessy (father of John), now operates in Oklahoma, Kansas, Texas, and Illinois, and maintains division offices at Wichita, Oklahoma City, and Midland. Globe has a gross daily production of 3,800 bbl. of crude, and operates a 30,000-bbl.-per-day refinery at Lamont, Ill. In addition, Lario has a gross daily production of 5,800 bbl.

Natural Gas, Coal, Oil Shale

as sources of liquid fuels

by E. V. Murphree

IN this article the United States resources of crude oil and raw materials for synthetic liquid fuels production are outlined and descriptions given on processing methods based on information which has been derived by or is available to Standard Oil Development Co. In addition, preliminary figures will be given on possible costs and material requirements for production of synthetic fuels from natural gas, coal, and oil shale. For comparison, corresponding figures are given for production from crude oil.

In summary, the present approximate figure indicates that the cost of producing gasoline from natural gas compares favorably with the cost of gasoline from crude oil. It is believed that sufficient technical information is now available for the design of natural-gas hydrocarbon-synthesis plants. United States resources of coal and oil shales represent tremendous reserves of potential oil supplies. It would appear that only minor development work is required in the case of oil-shale processing, mostly on the refining of raw oil. In the case of production of oil from coal, considering economies, which are in particular reflected in the present estimates, should be realized through development work on improved methods of gasifying coal.

RESEARCH on new and improved methods of producing liquid fuels from nonpetroleum raw material, such as from natural gas, coal, and oil shales, has become a major project in the oil industry. A large program on such synthetic fuels is also being carried out by the U. S. Bureau of Mines.

The magnitude of effort concentrated on synthetic fuels may in part be judged from research expenditures. The B. of M. has been working on a $30,000,000 program of research into coal hydrogenation, Fischer-Tropsch synthesis, as well as oil-shale mining and processing, and legislation has just been approved by Congress to extend the original appropriation to $60,000,000.

Standard Oil Co. (N.J.) has been very active in this field for many years. Some 20 years ago it started a $10,000,000 development program on hydrogenation of oil and coal. In addition, large oil - hydrogenation plants were erected and operated for a number of years. Later, work was started on development of the hydrocarbon-synthesis process, a modification and appreciable improvement of the German Fischer-Tropsch process, for making gasoline from natural gas and coal, but was discontinued during the war years. In 1945 work on the hydrocarbon-synthesis process was resumed and up to the present time about $10,000,000 has been spent on this development. In addition, considerable work has been carried out by the Jersey group on retorting of oil shales.

Vigorous research programs on synthetic fuels have also been carried out by other oil companies. Last year, for example, it is estimated that the oil industry spent in excess of $10,000,000 on such research.

The extensive research effort, briefly outlined above, arises from the problem of meeting the country's expanding needs for oil products. One phase of this problem is to meet the needs for normal peacetime consumption, which, based on the present rate of increase, will be growing at the rate of around 75,000,000 bbl. of oil products per year. It is expected that the oil industry can and will meet this expanding demand through the installation of crude oil producing and refining facilities and through the installation of synthetic oil capacity where economical. A second phase of the oil supply problem is to make available supplies for military use in case of a national emergency.

Crude Oil

Proven reserves of crude oil are currently estimated slightly in excess of 23 billion barrels. This is the highest level ever reached in the United States. Statistics on proven reserves and production indicate that such reserves have, by and large, maintained about the same relationship to production. For instance, since 1935 the proven reserves as reported from year to year have remained at a level of about 12 to 15 years' supply. The current proven reserves are essentially at this level.

Cumulative production of crude oil since the start of the United States oil industry is about 35 billion barrels, which, when added to our current proven reserves, totals about 58 billion barrels of oil which has been found. The potential reserves yet to be found cannot, of course, be definitely predicted. However, based on geological reports of favorable sedimentary rock formations yet unexplored, it appears reasonable to believe that at least as much oil remains to be found in the United States as has been found to date. The cost for crude-oil production, however, has been increasing and it is possible that synthetic-oil capacity on a large scale will in time become competitive with liquid fuels produced from petroleum.

Natural Gas

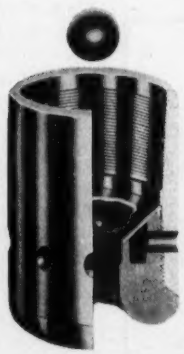
Natural gas is one of the most interesting materials which may be used for producing synthetic fuels, although it is limited in availability. The known natural-gas reserves in the United States are currently estimated to be about 170 trillion cubic feet. If this were all converted to oil,

The Author

THE author is president of Standard Oil Development Co., central research organization of Standard Oil Co. (N. J.). Murphree, 49, graduated from University of Kentucky and later was on the faculty at Massachusetts Institute of Technology. He joined Jersey Standard in 1930 to engage in petrochemical research. Two years later he became director of research and development at the Esso laboratories at Baton Rouge. He became manager of research and development for the development company in 1936, was appointed vice president in 1938, president in 1947.

This well is fixing to get a good cement job!

Cameron - Nuwell Float Collar, showing slotted cage which retains the large back-pressure valve ball but readily passes the smaller diverter ball shown entering the shoe below.



The way to get a good cement job is to place a column of cement entirely around the pipe . . . free of channels and bonded to the wall of the hole. And that's where Cameron-Nuwell Shoes and Collars enter the picture. Note in the cross-section view of the shoe at left that the lateral discharge ports are sealed off by means of a plastic diaphragm until the diverter ball is dropped and seated in the nose of the shoe. Pump pressure then shatters the diaphragm and opens the discharge ports. ALL OF THE CEMENT THEN FLOWS LATERALLY, AT HIGH VELOCITY, which tends to center the shoe in the hole and place an even column of cement entirely around the pipe. This high velocity flow also enables the operator to scour filter cake from the wall of the hole before cementing to assure a firm bonding with the formation.

Cameron-Nuwell Shoes and Collars offer a number of unique mechanical features, all of which are illustrated and explained in detail in your Composite Catalog, or literature will gladly be sent to interested operators on request.

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Cameron-Nuwell
CEMENTING EQUIPMENT

it would be equivalent of about 16 billion barrels of oil, which is about 70 per cent of the known oil reserves. The rate of discovery and extension of known reserves of natural gas averaged about 8 trillion cubic feet per year for the 15-year period ending in 1945, but increased rapidly over this period. Discoveries and extensions of known reserves for 1946 are about 13 trillion cubic feet and may be about 14 trillion cubic feet for 1947. Due to deeper drilling for oil, the trend is to find more gas relative to oil. It is believed reasonable, therefore, to assume a rate for extension of known reserves and new discoveries for the next few years of 10 trillion cubic feet per year.

Present consumption of natural gas for purposes other than carbon black, field use, and loss, is about 2.7 trillion cubic feet per year. Based on present usage, an estimate has been made of the gas that will be required in the future for carbon black, field use, and loss, amounting to 1.6 trillion cubic feet per year. This latter figure does not represent exactly present-day conditions, as certain improvement in loss are pictured. This quantity, when added to present-day consumption for industrial use and heating, gives a total of 4.3 trillion cubic feet.

New pipe-line capacity has been authorized or applied for amounting to 1.8 trillion cubic feet per year. Assuming all these pipe lines are installed, the consumption of natural gas would then be brought up to about 6.1 trillion cubic feet per year. On the assumption that the rate of discoveries and extensions would be 10 trillion cubic feet per year, there would then be available, without drawing on reserves, for either further pipe line and industrial use or for synthesis, about 3.9 trillion cubic feet of natural gas. When making still further allowance for increased industrial and heating use, it is believed that there will be enough natural-gas supplies to produce at least some 500,000 bbl. per day of oil products.

TABLE 1—ESTIMATED UNITED STATES COAL RESERVES
(Billions of tons in place, January 1, 1937*)

Location—Classification:	East of Mississippi River	West of Mississippi River	Total United States
Anthracite	15.1	0.3	15.4
Bituminous	837.5	570.3	1,407.8
Subbituminous	....	818.1	818.1
Lignite	....	939.5	939.5
Total	852.6	2,328.2	3,180.8

*Coal Reserves by T. A. Hendricks, Geological Survey, U. S. Department of the Interior. appearing in Energy Resources and National Policy, National Resources Committee, January 1939, Part 2—Section 1.

Synthetic Fuels From Gas

A schematic flow sheet for the production of synthetic fuels from natural gas appears in Fig. 1. There are two main steps in the process. In the first step, a deficiency of 95 per cent purity oxygen, prepared by liquefaction and distillation of air, is contacted with natural gas at elevated pressure and temperature to produce synthesis gas consisting essentially of hydrogen and carbon monoxide. The gas, after cooling and scrubbing, then flows to the second, or synthesis step.

In the synthesis reactors the gas is contacted with finely divided iron-type catalyst maintained as a fluid solids bed and the gases react to form mainly a mixture of hydrocarbons and some oxygenated chemicals, mostly alcohols. Upon cooling and oil scrubbing, there is separated raw hydrocarbon oil, containing essentially 90 per cent gasoline and 10 per cent gas oil, plus a water layer containing dissolved oxygenated chemicals.

The raw products are then processed to produce marketable materials. Synthesis gasoline is of particular interest since its octane number will exceed present premium grade gasoline and will, with some added lead, satisfy a 10 : 1 compression ratio engine which is capable of giving about 30 per cent more miles per gallon than present-day engines.

The natural-gas hydrocarbon-synthesis process has been well worked out on an experimental and pilot-plant scale, and two commercial plants of about 7,000 bbl. per day capacity each are being erected in this country by the oil industry.

Coal

The United States reserves of coal, including lignite, are estimated to be very large based on estimates prepared by the U. S. Geological Survey. Reserves are summarized in Table 1 according to rank and location east or west of the Mississippi River. These figures are approximate and are stated to represent coal deposits within 3,000 ft. of the surface. For estimating anthracite and bituminous coal, seams down to 14 in. in thickness were considered minable. For subbituminous and lignitic coal the minimum seam thicknesses considered were 24 and 36 in., respectively.

It will be noted that these estimates indicate that the reserve of coal in place, including lignite, amounts to about 3,200 billion tons. This is essentially equal to 2,500 billion tons of equivalent bituminous coal quality. Of this amount, on a heating-value basis, about two-thirds is west of the Mississippi River. The present consumption of coal in the United States is estimated at about 0.6 billion tons per year and it can be seen from these figures that the estimated reserves are very large compared to the consumption.

Consumption of oil products in the United States is increasing and may reach 7 million barrels per day in the near future. If all of these products were supplied from coal, assuming a coal consumption of ½ ton per barrel, the coal requirement would be about 1.3 billion tons per year.

There are, therefore, enough indicated coal reserves to supply the country's needs for both coal as such, and in addition, coal for making all of our oil requirements for about the next thousand years. Appreciable revision of these reserves will undoubtedly be required when considering only coal that can be mined at reasonable cost and at locations where the erection of synthetic-oil plants would be advantageous. Much of the coal is west of the Mississippi

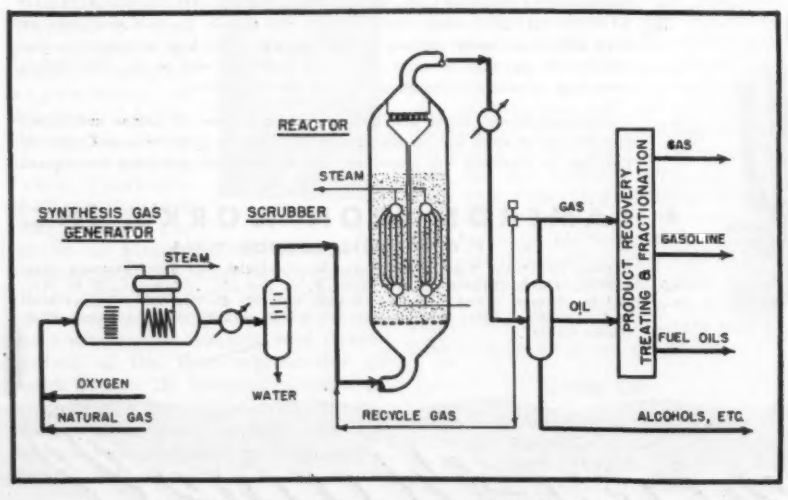


Fig. 1—The fluid hydrocarbon synthesis process

River and here water supply for synthetic-oil plants would be a very pressing problem. A much more detailed analysis would be required to determine the real possibilities from a quantity standpoint on production of oil from coal, taking into consideration water supplies and other factors.

The hydrocarbon-synthesis method of converting coal into oil products is very similar to the process described for natural gas. As in the case where natural gas is used as the raw material, it is essentially a two-step process, involving first the preparation of a synthesis gas, and second, its reaction over a catalyst. In this case, however, the gasification of coal to produce synthesis gas is accomplished with oxygen and steam. In addition, the raw synthesis gas produced from coal must be purified before entering the synthesis reactors. The synthesis reaction system, product recovery, separation, and treating steps are essentially the same for both raw materials.

Due to the difference between natural gas and coal as a raw material, the preparation of synthesis gas from coal is also quite different in terms of equipment from that required for natural gas. Considerable work was carried out in Germany on the production of synthesis gas from coal by continuous process methods as contrasted to the intermittent type of process that has been widely used for synthesis or water-gas manufacture. The gas-making processes developed in Germany had particular application to noncaking coals and do represent improvement over the discontinuous process.

It is believed that still further improvements can be made in the continuous production of synthesis gas from coal and considerable work along this line is now being carried out in this country. Certain of the processes being investigated are expected to handle caking coals equally as well as noncaking coals. It is felt that this development will lead to methods more economical than those developed in Germany. From a technical standpoint, therefore, the main step to be worked out for the conversion of coal to oil using the general principle of the hydrocarbon synthesis process is to get an improved method of making synthesis gas from coal. The cooperative research program between Pittsburgh Consolidation Coal Co. and Standard Oil Development Co. is vigorously pursuing this project.

An alternate method of producing oil products from coal is by the hydrogenation process. This process was extensively exploited in Germany and there is a large commercial plant located in England. Detailed information is available on the experience in commercial plants on hydrogenating coal in both countries. The U. S. B. of M. is now erecting a demonstration plant for this process following the general lines of the German developments. New features are to be tried in the demonstration plant which, if successful, will result in economies. The present paper, however, does not include figures for the production of synthetic fuels from coal by hydrogenation.

TABLE 2—ESTIMATED UNITED STATES SHALE-OIL RESERVES

State—	Estimated recoverable shale oil,* millions of bbl.
Colorado†	200,000
Utah	25,680
Wyoming	1,826
Nevada	4
Subtotal	227,510
Indiana	6,912
Kentucky	9,881
Subtotal	16,793
Pennsylvania—Cannel shale	8
W. Pennsylvania—Cannel shale	8
Subtotal	16
California‡	6,000
Grand total U. S. (approx.)	250,319

*Except for Colorado and California, reserves from Winchester in Federal Oil Conservation Board, Report to President, Appendix 1, Report 2, January 1928. †Preliminary estimate by Bureau of Mines in Report of the Secretary of the Interior to the Synthetic Liquid Fuels Act from January 1, 1947, to December 31, 1947. ‡Estimated from miscellaneous data.

Oil Shale

Shale deposits in the United States are quite large. The approximate deposits, exclusive of tar sands and gilsonite, are listed in Table 2. The Rocky Mountain-area reserves are based on minable deposits of shales containing at least 15 gal. per ton, whereas shales in the Indiana-Kentucky area normally average 15 gal. per ton. Some of the California shales are not strictly comparable to the other shales, differing in that their oil content is a true oil and could be extracted with solvents. They are reported to yield about 25 gal. of oil per ton.

The Green River formation of northwestern Colorado appears to be the major oil-shale deposit in the United States and it is indicated to be at least 500 ft. thick. Within this deposit there appear to be minable beds 70 to 90 ft. thick, having an average oil yield of 30 gal. per ton. This formation is reported to cover an area of approximately 1,000 sq. miles. The Bureau of Mines project at Rifle, Colo., is concerned with developing mining and processing methods for the 70 to 90-ft. thickness of rich oil shale.

After making allowance for the shale which must be left underground for supporting pillars in the proposed Bureau of Mines quarry method of mining, it would appear that the 70 to 90-ft. bed of Colorado shale alone would yield the equivalent of 75 to 90 billion barrels of recoverable oil. This richness of oil shale has been considered in the present study, although at least an equal quantity of reserves appears to exist in Colorado at richness of about 15 gal. per ton. There are also substantial deposits of oil shale in other states. For processing this material, particularly in Colorado and other western states, water supply would be a major factor in determining the rate at which shale can be processed.

The organic matter in oil shale breaks down and distills when shale is heated in the range of 800° to 1,000° F. One of the problems in using shale has been a cheap method of carrying out the heating or retorting. In the last few years, largely as an outgrowth of developments on catalytic cracking of oil, some new processes for retorting of shale have

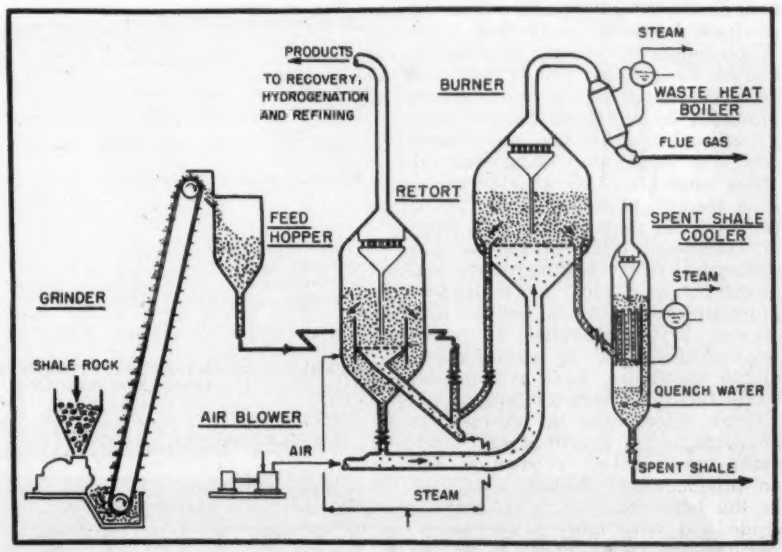


Fig. 2—The fluid shale-oil retorting process

been proposed and at least partially demonstrated which appear to offer considerable improvement over older processes.

The process considered herein for processing oil shale is schematically shown in Fig. 2. The shale, after crushing, is fed to the retorting vessel of the two-vessel system operating on the fluid solids principle. Heat for retorting is supplied by withdrawing shale from the reactor to the burner. In the latter vessel a portion of the residual carbonaceous material on the spent shale is burned with air, thus heating the spent shale above the retorting temperature. The heated spent shale is then circulated back to the reactor.

This process, like other oil shale retorting processes, yields a rather heavy product of disagreeable odor. The product so obtained is transported by pipe line to a refinery where the raw shale oil is hydrogenated to a quality equivalent to crude oil and then processed into gasoline using conventional refining techniques.

Retorting of Colorado oil shales by the process described has been successfully demonstrated in small pilot plants. A large-scale demonstration of the Jersey fluid-retorting process will be made this year. The Bureau of Mines is supplying the oil shale for this demonstration. In addition, some development work is required on the refining of shale oil.

Costs and Material Requirements

A study of approximate costs and steel requirements has been made for comparing the production of liquid fuels from crude oil and from natural gas, coal, and oil shale. In each case figures are based on present-day construction of complete facilities. These not only include manufacturing, but also facilities for the production and transportation of the raw materials and, in addition, the transportation of products to stated marketing areas. Where employe housing may be required, the possible cost is indicated.

Of the total liquid hydrocarbons produced by synthesis from natural gas or coal, about 90 per cent is gasoline, the remainder being gas oil. Minor amounts of oxygenated chemicals are also produced. Crude petroleum can be processed to give varying yields of different products as distinguished by boiling range and quality. For instance, one method of processing crude oil is for the production of a minimum of heavy residual fuel and a maximum of middle distillates, such as kerosine, diesel fuel, and domestic heating oil.

Crude oil can also be processed to yield maximum gasoline with minimum heavy-fuel-oil production and no production of middle distillates. In the latter case, with an average crude and with modern equipment, gasoline can represent 85 to 90 per cent of the total liquid products which would amount to a gasoline yield on normal crude oil of about 75 per cent. Since the prices of distillates are normally roughly based on their value for making gasoline, it is felt that the production of synthetic fuels from natural gas and coal can most simply be compared with processing crude oil for maximum yield of gasoline.

This method of comparison is also convenient in that all of these processes have gasoline yields on total oil of about the same magnitude, thus minimizing the effect of byproduct credits. Furthermore, the processing of shale oil can be carried out after hydrogenation to yield a distribution of products equivalent to normal crude oil. Thus, this process can readily be compared with the other methods of making gasoline.

The comparisons of costs and material requirements on the basis of processing to maximum yield of gasoline appear in Table 3. Figures for investments and operating costs must be considered only as indications of possible costs, since the large amount of research on synthetic fuels is continually improving the processing methods, and the estimates themselves are difficult to make in view of constantly changing price levels. Furthermore, for any particular process the investments and material requirements can be markedly influenced by the size of the plant and its exact location. For instance, the location in particular determines the investments for water supplies, transportation, and housing.

The figures presented are for large plants based on stated particular locations and with transportation of products to stated marketing areas. There are very likely more favorable locations and certainly less favorable locations than those chosen for these estimates. With regard to process, the estimates for oil from coal and oil shale assume the successful conclusion of development work now in progress on coal gasification and shale oil refining.

Possible investments for housing have not been included in Table 3, although housing to the extent of about $900 per barrel per day of gasoline would be required for oil-shale mining and retorting for the Colorado location. Since the hydrogenation and refining of raw shale were assumed to be carried out at sites on the West Coast, no housing for this personnel was believed to be required. Some housing may also be required for the eastern coal-plant location and although the amount cannot be estimated with any normal degree of accuracy, complete housing for this case might amount to $2,900 per barrel per day of gasoline.

(Continued on page 95)

TABLE 3—APPROXIMATE INVESTMENTS AND STEEL REQUIREMENTS FOR MAXIMUM GASOLINE PRODUCTION

Plant location	Gulf Coast		W. Pa.	Colo.-Calif.*
Product market area	Eastern Seaboard		W. Pa.	Calif.
Raw material—	Crude oil	Natural gas	Coal	Oil shale
Gasoline, per cent of total liquid products	87	90	89	87
Investment, $/B/D gasoline	6,500	8,200	8,500	8,400
Steel requirement, Tons/B/D gasoline	7.8	7.9	5.2	7.4

*Shale mined and retorted in Colorado. Raw shale oil transported by pipe line to California for refining.

TABLE 4—APPROXIMATE COST OF GASOLINE FOR MAXIMUM GASOLINE PRODUCTION

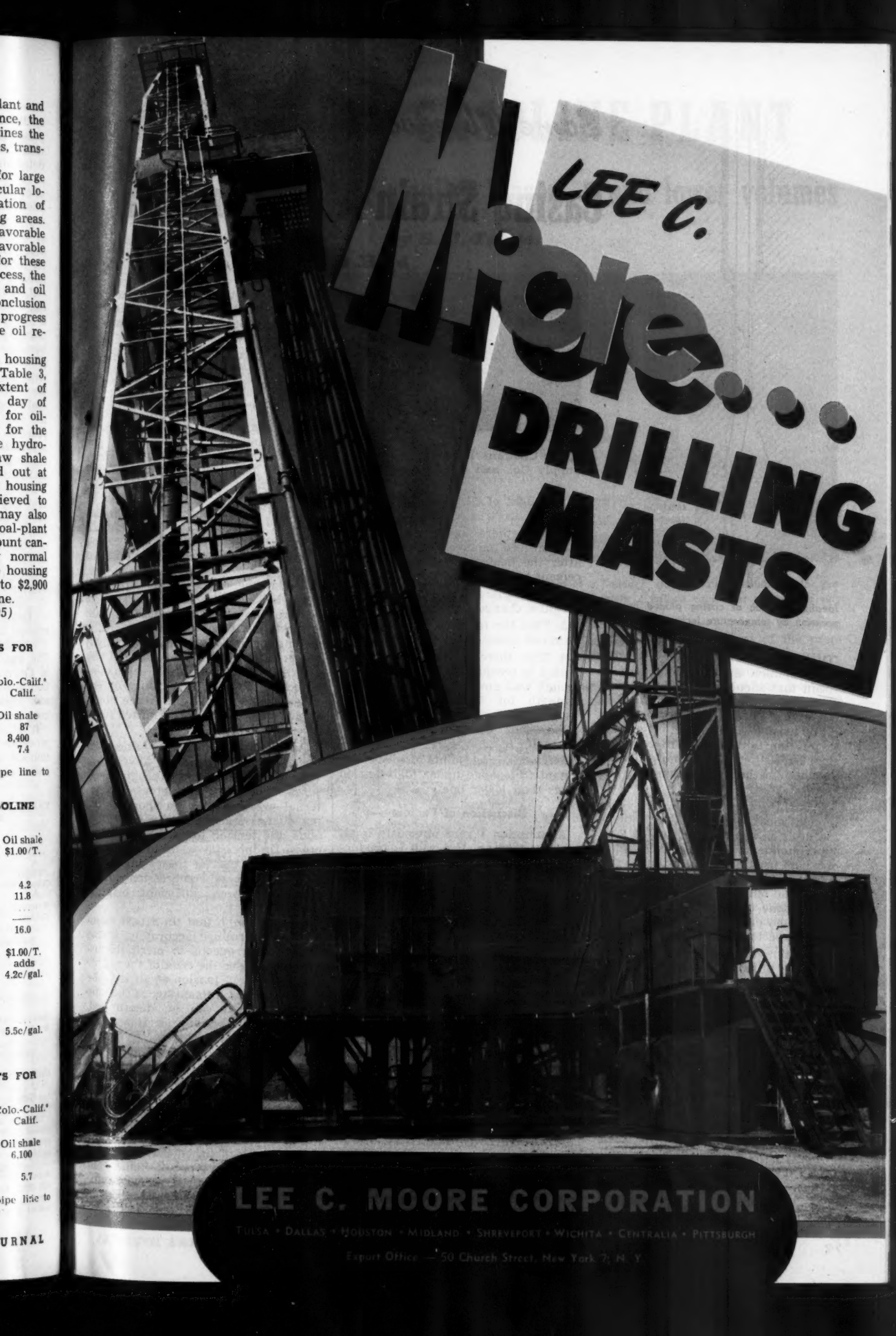
Raw material—	Crude oil	Natural gas	Coal	Oil shale
Raw-material charge, assumed or estimated	$2.78/B.*	10c/M.c.f.†	$3.20/T.	$1.00/T.
Gasoline cost, cents per gallon:				
Raw material	*8.8	†2.9	3.9	4.2
Manufacturing less credits	4.3	8.9	12.7	11.8
Production transportation	1.0	1.0	...	...
Total (incl. 15 per cent capital charges)	14.1	12.8	16.6	16.0
Effect of increase in raw-material charge	$1.00/B. adds 3.2c/gal.	10c/M.c.f. adds 2.9c/gal.	$1.00/T. adds 1.2c/gal.	$1.00/T. adds 4.2c/gal.
Effect of 10 per cent capital charge on investment in:				
Manufacturing	1.6c/gal.	3.7c/gal.		
Manufacturing plus mining	....	.....	5.6c/gal.	5.5c/gal.

*Price delivered to refinery. †Price in field after gathering.

TABLE 5—APPROXIMATE INVESTMENTS AND STEEL REQUIREMENTS FOR MAXIMUM MIDDLE-DISTILLATE PRODUCTION

Plant location	Gulf Coast		W. Pa.	Colo.-Calif.*
Product market area	Eastern Seaboard		W. Pa.	Calif.
Raw material—	Crude oil	Natural gas	Coal	Oil shale
Investment, $/B/D total oil products	4,300	7,400	7,600	6,100
Steel requirement, Tons/B/D total oil products	5.7	7.1	4.6	5.7

*Shale mined and retorted in Colorado. Raw shale oil transported by pipe line to California for refining.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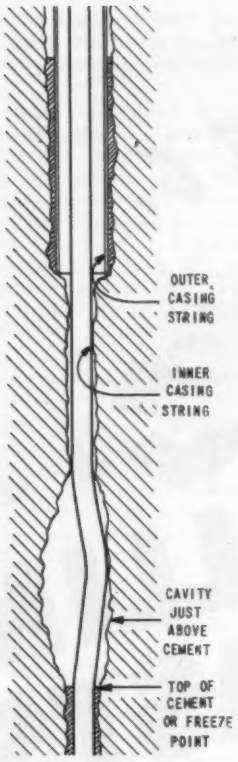
Some Observations on

Casing Strain After Cementing

by H. G. Texter

In this article the conclusion is presented that casing should be left in full tension after cementing. Factors involving this reasoning are discussed. The author is chief field engineer for Spang-Chalfant Division of National Supply Co., and is located at Tulsa.



Idealized sketch of casing placed in compression by temperature increase

THERE still exists a wide difference of opinion as to the amount of strain that should be left in a string of casing at the time of landing it in the casing head. Some operators let off no tension and some let off enough to put the bottom part in compression, but as yet there is no generally accepted method of determining the strain.

Probably because no one ever thought clearly through the problem, the decision has been left up to local superintendents or field men, most of whom used old, rule-of-thumb calculations. For example, some let off "half the tension," some let off "a third of the tension," and so on, but there is no clear definition as to just what these terms mean.

In 1943 several Shell Oil Co., Inc., engineers proposed an interesting and very logical procedure based on the theory that casing should be in neither tension nor compression at the freeze point. Or, to insure against errors, a slight excess of tension, 6,250 to 10,000 psi. (2½ to 4 in. per 1,000 ft.) was suggested. Thereafter the Shell procedure gained many adherents with apparently no trouble. *(See O'Donnell and Crake's article—"Mechanical Causes of Casing Failure and Practices for Their Control." The Oil and Gas Journal, December 16, 1943, page 46.)*

However, to justify the O'Donnell and Crake proposal it is necessary to accept certain assumptions which, in the light of further study, seldom or never are true:

1. That there never will be any temperature changes in the casing after the heat of reaction of setting cement has been dissipated.

2. That there never will be any pressure changes inside the casing.

3. That the freeze point can be determined reasonably accurately.

4. That there is danger of casing failing in tension, at high loads, even though well under the minimum joint strength for the size, grade, and weight involved and if left under these loads throughout the life of the well.

5. That casing joints are less resistant to leakage under high-tension loads than lower ones.

Discussion of Factors

Assumption 1 very obviously is almost never true. If a well is producing some gas, and with a bottom-hole choke, there will be a refrigerating effect. This would tend to contract the casing and increase the tension loading at the casing head.

Increase in tension, due to **lowering** temperatures, is not much to be feared. Consider, for a moment, that the coefficient of expansion for steel is 6.9×10^{-6} per degree (F.). Or, converted to stress, where a bar (string of casing) is firmly held at both ends, it means that a 1° change in temperature produces a change in stress of only 207 psi. Therefore, even a 75° cooling of a cemented string of casing, no matter how long nor how short, would increase the tension stresses by only 15,525 psi. Now, 75° cooling surely could be considered as an exceptional condition, possibly never encountered in any well, as it implies a 75° **average** drop in temperature **over the entire free portion** of the pipe. Also, even with that unusual degree of cooling, the increase in stress would not be dangerous unless subnormal safety factors in tension were involved.

Much more to be feared is an **increase** in temperature of the casing, as the well is being produced. This is what more often happens since most wells are produced with top-hole chokes and, instead of there being a refrigerating effect, the oil and gas bring up heat from below and thus raise the temperature of the casing. So, reversing the effect of cooling, we would now have **decreases** in strain at the rate of 207 psi. per degree.

In the upper part of the casing string decreases in tension would, of course, have no effect whatsoever, but near the freeze point, especially if the tension were already near zero, compression loading could result. And casing is **not** designed to resist column loading. Under relatively light compression loads it will fail by buckling, causing thread breakage, especially if there is a cavity or enlarged section above the freeze point. Casing must **never** be permitted to be in compression.

Assumption 2 also is seldom or never true. There nearly always are very wide variations in casing pressures in deep wells. Increases in internal pressure tend to shorten casing strings and, being fixed at both ends, the tension loads increase. Decrease in pressure due to depletion may change part of the casing string from tension to compression unless there had been sufficient original tension.

Assumption 3, that the freeze point can be determined accurately, is too obviously erroneous to merit discussion. Yet this is the crux of the whole problem if any tension at all is to be released after cementing. (The top of the cement can be determined, but often the casing is frozen far above the cement.)

Assumption 4, that time might be a factor in causing tension failures, is also entirely erroneous. It probably won credence because of failures, now understood as "last engaged thread" breaks, which were once thought to be caused by tension. Later it was pretty well established that they were a notch-fatigue type of failure in which the fatiguing stresses were produced by the hammering of tool joints

(Continued on page 96)

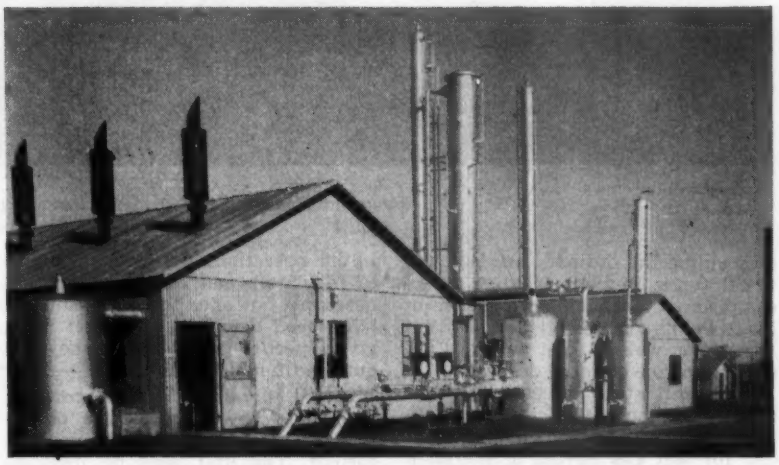
NEW MIDGET GASOLINE PLANT

. . . for smaller leases . . and lower volumes

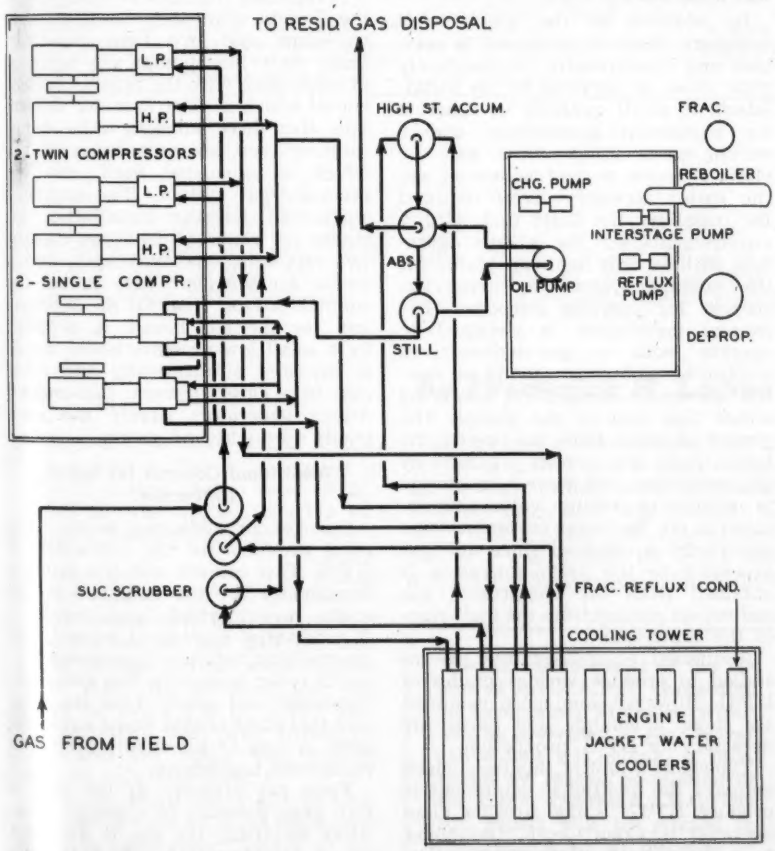
by R. B. Tuttle

NEW to oil operators is the recent development of a "midget" gasoline plant, designed specifically for the smaller leases and lower-volume wet-gas supplies. Most gasoline plants in recent years for economic reasons have been tailored either to the larger oil fields or large groups of leases which could supply gas volumes generally in excess of 10 million cubic feet per day, or some 10,000 gal. per day of liquid content.

This new midget gasoline-plant design is laid out primarily for the production of natural gasoline, and in its simplest form does not embrace L.P.G. production. Facilities for the extraction of L.P.G. may be added to the basic layout when desired. The process is designed particularly for adaptation to wet-gas supplies from leases producing 150,000 to 3,000,000 cu. ft. per day. Rapidity of payout on an installation of course is dependent on the gasoline content of the processed gas.



This photograph shows the arrangement of a "midget" gasoline plant expanded for production of L.P.G. Plant is processing approximately 2 million cubic feet of gas per day



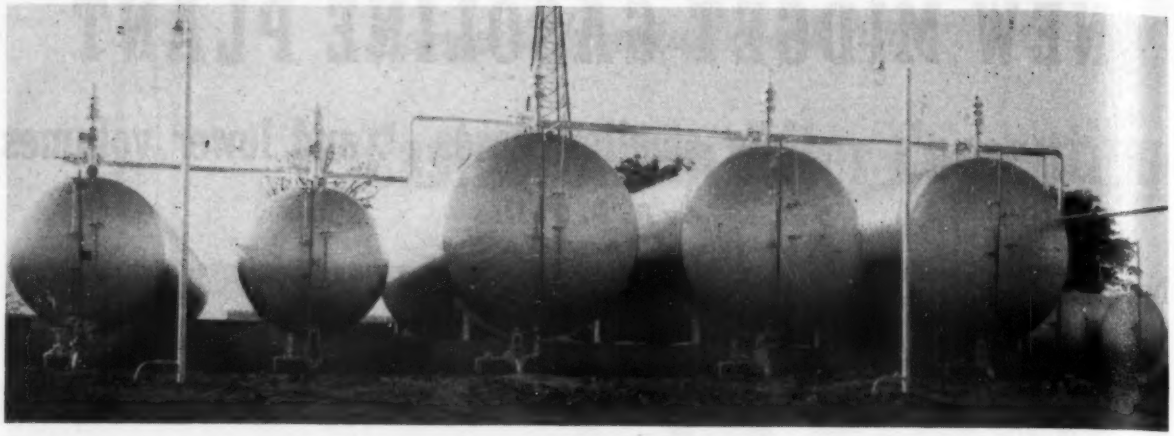
Flow arrangement of the Arcadia plant operating in Cook Creek field (Oklahoma). Liquid flow in the fractionating section of the plant is conventional. Flow direction indicated on the lines in the diagram are only on the gas section of the layout

The principal operating feature is the control system which provides complete safety. In fact, the plant is designed for operation without specially trained personnel or without a specific operator. Other than periodic inspection and servicing of pumps and compressors the unit requires no attention once it is placed in operation. With the exception of failure in its gas supply or breakdown of its pumps or compressors the plant will operate continuously.

Operated Without Reboilers

Design of the plant does not include reboilers of any nature. Rather, the fat-oil stripper is operated at a pressure at or near atmospheric. Pressure is maintained by connecting the suction of a single-stage compressor to the top of the column. This arrangement is shown to be profitable even when market prices are substantially below those of today. However, the method is not suited economically for a gasoline-recovery efficiency in excess of 90 per cent as determined by fractional analysis.

General arrangement of the basic plant, which is designed to produce commercial natural gasolines only, consists of a conventional scrubber ahead of an absorber column. Gas from the field (30 psi. minimum) is metered to the scrubber as is the residue gas leaving the absorber. As mentioned, the fat-oil stripper oper-



Natural-gasoline and L.P.G. storage at Arcadia plant

ates unlike the ordinary and conventional types, in that stripping is accomplished without the addition of heat. Points of takeoff for fat and lean oil as well as inlet positions are similar to conventional designs.

A careful study reveals the economic maximum capacity to be in the vicinity of 3 million cubic feet per day for wet gas having a minimum gasoline content of approximately or slightly under ½ gal. per thousand cubic feet. The minimum capacity appears to fall close to 150,000 cu. ft. per day of 2-gal. per-1,000-cu.-ft. gas when considered at current marketing prices. Minimum gas pressure at the absorber is specified at 30 psi. and consequently field pressures should be in excess of that value before separation. In the event field pressures are too low to provide the necessary pressure at the absorber, a compressor may be installed to boost the incoming field gas to the desired 30 psi. or higher.

Exchangers Needed for L.P.G. Production

Tubular heat-transfer equipment of the conventional type is employed only for the fractionator reboiler and for cooling high-compression-stage vapors and gases after they have given up heat when passing through the reboiler and before they enter the top of the fractionator. This cooling unit if of the drip type and is installed in the cooling tower along with a pipe coil for product cooling. Cooling water for the engine jackets on its return cycle to the cooling tower is utilized as the spray-cooling medium and is circulated by the single water pump.

Starting operations, either initially or after automatic shutdown, are simple and involve only knowledge concerning the starting and care of the compressor. When the unit is shut down by the automatic controls it cannot be returned to operation until conditions causing the shutdown have been repaired or remedied as the case may be. In starting up on initial operations a few adjustments to regulators and certain valves are necessary but once these adjustments have been determined and set for a given-specification product they require no further attention.

Actual operation of the process can be handled by one or more of the regular lease operating personnel, as desired. The unit may be installed adjacent to the lease separator or in any other location convenient for the lease crew.

In addition to the plant's full automatic feature its layout is compact and consequently comparatively little space is required for its installation. A small quantity of concrete for equipment foundations and a cooling-tower sump, which may be either concrete or steel as desired, are the major accessory items required for installing the basic unit. Utility requirements for the plant's operation include only makeup water for the cooling system and electrical service for lighting purposes. The normal installation is designed to operate with a gas-engine-driven compressor and consequently no electric service is needed for powering either that unit or the pumps. The pumps, of which there are two for the basic plant, are driven via belt by the compressor and serve respectively in circulating cooling water and absorption oil. No boiler or similar type equipment is required since all heat necessary to the unit's operation is obtained from the compressed gas and vapors coming from the high stage of the compressor.

Additional equipment may be installed to produce various grades of L.P.G. However, one more compressor stage, a column, and boiler are necessary for L.P.G. production.

Typical of a unit of this type which employs the additional equipment to produce L.P.G. is the Arcadia plant operated in Coon Creek, Oklahoma, field by Grimes Gasoline Co. Designed by the L. S. Gregory Co., Tulsa, this plant processes 2,000,000 cu. ft. per day of gas and produces 8,000 gal. per day of liquids (natural gasoline plus L.P.G.).

Plant production figures show that 91 per cent of the natural-gasoline components and 90.7 per cent of the total butanes are extracted when producing 120-lb. L.P.G. and 22-lb. gasoline. When comparing the difference in the analyses of inlet and residue gases with the foregoing figures no variation in over-all efficiency is indicated.

Compressor equipment installed at the Arcadia plant includes two single two-stage and two twin two-stage units. Only four pumps are operated in connection with the process proper, one of which is electric-motor driven. The other three pumping units, reciprocating type, are powered with gas which is exhausted back into the processed-gas system. Heat-exchange equipment for the installation includes six banks of drip-type coolers, two reboilers, one exchanger, and a heater for the gas which drives the simplex pumps. Heat for the reboilers and for the gas heater is supplied by a small low-pressure boiler which is gas-fired automatically and operates in a closed system. Gas-engine-driven generators supply the electricity for light and power.

Additional Column for L.P.G. Extraction

One column additional to the basic plant provides for the extraction of L.P.G. This column and the primary fractionator are the only two in the entire layout which have reboilers. A substantial number of controls are incorporated into this augmented layout in order to provide full automatic regulation and safety. Like the basic unit this plant is shut down automatically in case of gas-supply failure or equipment breakdown.

Field gas pressure at the unit is zero gage pressure or slightly above. After metering, the gas is delivered into a scrubber from which the low side of the twin compressors take suction. These compressors discharge

(Continued on page 90)

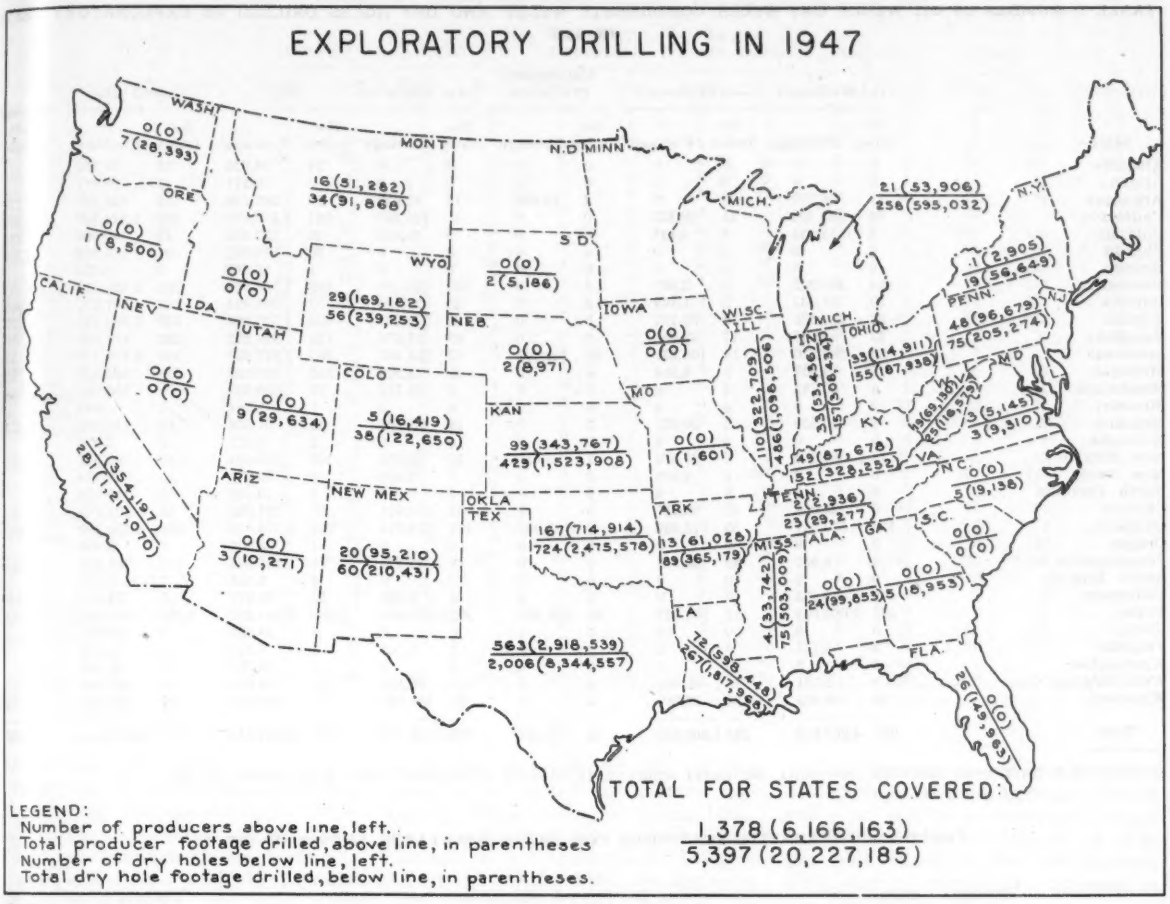


Fig. 1

Wildcat Drilling in 1947

by Frederick H. Lahee

IN the states covered in this review, as shown in Fig. 1, and listed in Table 1, during 1947 a total of 26,393,348 ft. was drilled in 6,775 exploratory holes, divided as follows:

	Feet
1,378 producers	6,166,163
5,397 dry holes	20,227,185

This means that 20.3 per cent of the holes drilled, and 22.9 per cent of the footage drilled, were successful in 1947. One producer foot was drilled for every 3.28 ft. of dry hole. One successful well was drilled for every 3.90 dry holes. The average depth of hole was 3,896 ft.

In the southern states district (Fig. 2), in 1946, a total of 15,134,605 ft. was drilled in 3,200 holes, divided as follows:

	Feet
644 producers	3,671,821
2,536 dry holes	11,462,784

In this area, then, 20.8 per cent of the holes drilled, and 24.3 per cent of the footage drilled, were successful. One producer foot was drilled for every 3.12 ft. of dry hole. One successful well was drilled for every 3.82 dry holes. The average depth of hole was 4,730 ft. For comparison with statistics for this same area in 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, and 1946, see Table 2.

This extensive digest of the report of the A.A.P.G. Committee on Exploratory Statistics, which will be presented at the Denver convention this month, is published by special permission of the author and the A.A.P.G. The full report will be printed in the June A.A.P.G. Bulletin.

The author is chief geologist for Sun Oil Co.

In Table 3 are listed the reasons for drilling the exploratory holes in 1947, by using the best information available from men familiar with such statistics, each in his own state or district. According to these figures 1,301 exploratory holes drilled on technical advice (geology and/or geophysics) were successful, and 4,558 were dry; 31 holes, located for non-technical reasons, were producers, and 533 were dry; 46 producers and 336 dry holes were located for reasons unknown. These figures show that 22.2 per cent of the holes drilled on technical advice were producers as contrasted with 5.5 per cent successful in the case of the holes located

TABLE 1—NUMBER OF OIL WELLS, GAS WELLS, CONDENSATE WELLS, AND DRY HOLES DRILLED AS EXPLORATORY TESTS IN 1947

State—	Oil producers		Gas producers		Condensate producers		Total producers		Dry		Grand total		Average depth of hole*
	No. holes	Footage	No. holes	Footage	No. holes	Footage	No. holes	Footage	No. holes	Footage	No. holes	Footage	
Alabama	0	0	0	0	0	0	0	0	24	99,853	24	99,853	....
Arizona	0	0	0	0	0	0	0	0	3	10,271	3	10,271	....
Arkansas	11	46,172	0	0	2	14,856	13	61,028	89	365,179	102	426,207	4,179
California	60	304,465	11	49,732	0	0	71	354,197	281	1,217,070	352	1,571,267	4,464
Colorado	3	11,925	2	4,494	0	0	5	16,419	38	122,650	43	139,069	3,234
Florida	0	0	0	0	0	0	0	0	26	149,963	26	149,963	5,768
Georgia	0	0	0	0	0	0	0	0	5	18,953	5	18,953	....
Illinois	108	319,042	2	3,667	0	0	110	322,709	486	1,098,506	506	1,421,215	2,385
Indiana	30	51,687	3	1,749	0	0	33	53,436	157	308,434	190	361,870	1,905
Kansas	83	280,030	16	63,737	0	0	99	343,767	429	1,523,908	528	1,867,675	3,537
Kentucky	32	54,635	17	33,043	0	0	49	87,678	152	328,252	201	415,930	2,069
Louisiana	36	292,226	14	106,221	22	200,001	72	598,448	267	1,817,968	339	2,416,416	7,128
Michigan	16	44,352	5	9,554	0	0	21	53,906	258	595,032	279	648,938	2,326
Mississippi	4	33,742	0	0	0	0	4	33,742	75	503,009	79	536,751	6,794
Missouri	0	0	0	0	0	0	0	0	1	1,601	1	1,601	....
Montana	8	30,355	8	20,927	0	0	16	51,282	34	91,868	50	143,150	2,863
Nebraska	0	0	0	0	0	0	0	0	2	8,971	2	8,971	....
New Mexico	12	54,153	7	35,370	1	5,687	20	95,210	60	210,431	80	305,641	3,821
New York	0	0	1	2,905	0	0	1	2,905	19	56,649	20	59,554	....
North Carolina	0	0	0	0	0	0	0	0	5	19,138	5	19,138	....
Ohio	6	22,654	27	92,257	0	0	33	114,911	55	187,938	88	302,849	3,441
Oklahoma	129	573,344	35	112,590	3	28,980	167	714,914	724	2,475,578	891	3,190,492	3,581
Oregon	0	0	0	0	0	0	0	0	1	8,500	1	8,500	....
Pennsylvania	6	9,907	42	86,772	0	0	48	96,679	75	205,274	123	301,953	2,455
South Dakota	0	0	0	0	0	0	0	0	2	5,186	2	5,186	....
Tennessee	2	2,936	0	0	0	0	2	2,936	23	29,277	25	32,213	1,289
Texas	407	2,004,869	112	584,707	44	328,963	563	2,918,539	2,006	8,344,557	2,569	11,263,096	4,384
Utah	0	0	0	0	0	0	0	0	9	29,634	9	29,634	....
Virginia	3	5,145	0	0	0	0	3	5,145	3	9,310	6	14,455	....
Washington	0	0	0	0	0	0	0	0	7	28,393	7	28,393	....
West Virginia	1	2,131	18	66,999	0	0	19	69,130	25	116,579	44	185,709	4,221
Wyoming	24	136,902	5	32,280	0	0	29	169,182	56	239,253	85	408,435	4,805
Total	981	4,280,672	325	1,307,004	72	578,487	1,378	6,166,163	5,397	20,227,185	6,775	26,393,348	3,896

*Averages have been recorded here only for states where more than 25 exploratory holes were drilled in 1947.

TABLE 2—COMPARATIVE STATISTICS FOR SOUTHERN STATES, SHOWN IN FIG. 2*

Year	Producers drilled: Holes: Number	Holes: Per cent	Footage: Feet	Footage: Per cent	Dry holes drilled: Holes: Number	Holes: Per cent	Footage: Feet	Footage: Per cent	Total No. explor. holes drilled	Total feet drilled	Average depth of hole	No. of dry hole feet drilled for each producer foot
1938	200	13.6	984,262	17.4	1,271	86.4	4,667,402	82.6	1,471	5,651,664	3,842	4.74
1939	161	12.6	779,345	14.8	1,113	87.4	4,501,669	85.2	1,274	5,281,014	4,145	590
1940	187	12.8	919,506	†14.9	1,279	87.2	†5,251,273	†85.1	1,466	6,170,779	†4,209	†5.71
1941	258	16.5	1,264,774	18.4	1,305	83.5	5,578,975	81.6	1,563	6,843,749	4,372	4.41
1942	231	16.3	1,289,480	19.6	1,186	83.7	5,295,556	80.4	1,417	6,585,036	4,647	4.11
1943	287	17.3	1,546,956	18.8	1,369	82.7	6,680,512	81.2	1,656	8,227,468	4,968	4.32
1944	473	21.1	2,804,005	23.5	1,765	78.9	9,095,421	76.5	2,238	11,899,426	5,317	3.24
1945	613	22.7	3,508,301	26.1	2,093	77.3	9,944,302	73.9	2,706	13,452,603	4,971	2.83
1946	538	20.4	3,276,458	26.0	2,097	79.6	9,304,018	74.0	2,635	12,580,476	4,774	2.84
1947	664	20.8	3,671,821	24.3	2,536	79.2	11,462,784	75.7	3,200	15,134,605	4,730	3.12

*In this table, New Mexico data are for the southeastern part of the state only. †See A.A.P.G. Vol. 25, p. 1938, where corrections are mentioned for these figures as they appeared in Table 1, p. 1001 of the same volume.

Fig. 2

TABLE 3—BASIS FOR LOCATING EXPLORATORY HOLES DRILLED IN 1947

State—	Geology		Geophysics*		Geology and geophysics*		Sundry nontechnical		Unknown		Total		Grand total
	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	
Alabama	0	5	0	12	0	1	0	4	0	2	0	24	24
Arizona	0	1	0	0	0	0	0	2	0	0	0	3	3
Arkansas	8	58	1	15	4	13	0	2	0	1	13	89	102
California	59	203	2	2	8	44	2	25	0	7	71	281	352
Colorado	5	27	0	1	0	6	0	1	0	3	5	38	43
Florida	0	7	0	15	0	0	0	4	0	0	0	26	26
Georgia	0	0	0	1	0	0	0	4	0	0	0	5	5
Illinois	104	421	0	3	6	32	0	25	0	5	110	486	596
Indiana	27	122	1	0	0	2	5	26	0	7	33	157	190
Kansas	83	291	10	26	1	16	5	95	0	1	99	429	528
Kentucky	45	117	1	0	0	0	1	22	2	13	49	152	201
Louisiana	31	129	25	81	16	56	0	1	0	0	72	267	339
Michigan	19	227	0	0	0	1	1	3	1	27	21	258	279
Mississippi	0	19	2	33	2	18	0	4	0	1	4	75	79
Missouri	0	0	0	0	0	0	0	0	0	1	0	1	1
Montana	10	23	2	1	4	2	0	4	0	4	16	34	50
Nebraska	0	0	0	1	0	0	0	1	0	0	0	2	2
New Mexico	17	26	2	3	0	0	0	4	1	27	20	60	80
New York	1	13	0	0	0	1	0	2	0	3	1	19	20
North Carolina	0	0	0	0	0	1	0	0	0	4	0	5	5
Ohio	7	17	10	0	0	0	3	8	13	30	33	55	88
Oklahoma	123	375	26	98	3	0	9	230	6	21	167	724	891
Oregon	0	0	0	0	0	1	0	0	0	0	0	1	1
Pennsylvania	32	39	0	0	0	0	2	10	14	26	48	75	123
South Dakota	0	2	0	0	0	0	0	0	0	0	0	2	2
Tennessee	0	10	0	0	0	0	0	0	2	13	2	23	25
Texas	397	1,348	76	303	82	202	3	48	5	105	563	2,006	2,569
Utah	0	5	0	2	0	0	0	2	0	0	0	9	9
Virginia	1	3	0	0	0	0	0	0	2	0	3	3	6
Washington	0	1	0	6	0	0	0	0	0	0	0	7	7
West Virginia	19	20	0	0	0	0	0	1	0	4	19	25	44
Wyoming	14	29	7	12	8	9	0	5	0	1	29	56	85
Total	1,002	3,538	165	615	134	405	31	533	46	306	1,378	5,397	6,775

*Including geochemistry.

without technical advice.

Therefore, in 1947, locations based on technical recommendations were four times as successful as those drilled without such advice. With reference to new-field wildcats only, 200 producers and 1,691 dry holes were located mainly on geological bases; 101 producers and 516 dry holes were located on geophysics; 63 producers and 293 dry holes were located on geology plus geophysics; 15 producers and 380 dry holes were located on various nontechnical bases; and 15 producers and 197 dry holes were located for reasons unknown. Either alone or in combination with geology, seismographic methods were responsible for 159 producers and 747 dry holes. Among new-field wildcats, 12 per cent of the holes drilled on technical advace were successful. These figures refer to totals for all the states reported (Fig. 1 and Table 1).

Comparing last year's figures with figures for 1947 we note the following:

1. In number of exploratory holes drilled there was an increase of 17.76 per cent, and in exploratory footage drilled there was an increase of 19.06 per cent, based on the 1946 figures. This was a remarkable increase in the exploratory effort.

2. Considering new-field wildcats ("rank" wildcats) only, 1947 witnessed an increase of 11.28 per cent in holes drilled and an increase of 16.67 per cent in footage drilled, compared with 1946.

3. In most of the states there was a

TABLE 4—SUMMARY OF STATISTICS ON PROVED OIL RESERVES AND EXPLORATORY DRILLING IN 17-STATES AREA

Year	A Proved oil reserves as of Jan. 1 (1,000's of bbl.)	B Proved oil reserves as of Dec. 31† (1,000's of bbl.)	C Net new proved oil reserves (1,000's of bbl.)	D Oil production during year (1,000's of bbl.)	E Gross new proved oil reserves (C+D) (1,000's of bbl.)	F Total exploratory footage (ft.)	G New proved oil reserves (E) per exploratory foot drilled (bbl.) E/F	H Total No. of exploratory holes drilled	I New proved oil reserves (E) per exploratory hole drilled (bbl.) E/H
1938	15,102,239	17,056,370	1,954,131	1,183,733	3,137,864	8,830,166	355.3	2,633	1,191,744
1939	17,056,370	18,186,767	1,130,397	1,235,013	2,365,410	8,729,052	270.9	2,671	885,589
1940	18,186,767	18,688,777	502,010	1,322,794	1,824,804	10,055,499	181.5	2,981	612,161
1941	18,688,777	19,270,869	582,092	1,375,411	1,957,503	11,534,731	169.7	3,218	608,298
1942	19,270,869	19,792,818	521,949	1,355,102	1,877,051	12,050,366	155.7	3,180	590,267
1943	19,792,818	19,759,516	—33,302	1,475,881	1,442,579	14,950,309	96.5	3,788	380,828
1944	19,759,516	20,171,588	412,072	1,653,453	2,065,525	19,418,752	106.0	4,550	453,961
1945	20,171,588	20,566,405	304,817	1,713,725	2,108,542	21,963,026	96.0	5,282	399,194
1946	20,566,405	21,682,344	1,115,939	1,701,952	2,817,891	21,163,563	133.1	5,440	517,994
Year	Proved liquid hydrocarbon* reserves as of Jan. 1 (1,000's of bbl.)	Proved liquid hydrocarbon reserves as of Dec. 31† (1,000's of bbl.)	Net new proved liquid hydrocarbon reserves found during year (1,000's of bbl.)	Liquid hydrocarbon production during year (1,000's of bbl.)	Gross new proved liquid hydrocarbon reserves (C+D) (1,000's of bbl.)	Total exploratory footage drilled during year (ft.)	New proved liquid hydrocarbon reserves (E) per exploratory foot drilled (bbl.) E/F	Total No. of exploratory holes drilled during year	New proved liquid hydrocarbon reserves (E) per exploratory hole drilled (bbl.) E/H
1947	23,723,140	24,457,639	734,499	1,983,102	2,717,601	25,224,976	207.7	6,410	423,962

*The proved oil reserves shown in this table, from 1938 to 1946, inclusive, are comparable in the sense that they include crude oil and cycle plant condensate with some lease condensate. This statement applies to 1946 where figures analogous to those preceding have been used, although the report of the American Petroleum Institute for December 31, 1946, has been prepared on a different basis. For 1947 the figures refer to crude oil plus natural-gas liquids, and are listed as "liquid hydrocarbons." Unfortunately we have no figures for 1947 exactly comparable with 1946 and earlier. †This figure happens to be between 98 and 99 per cent of the total proved oil reserves of the United States as of the same date (December 31) each year.

This new seating arrangement

PUTS WEAR IN THE PROPER PLACE

Newly-designed Jenkins gate valve uses hard, corrosion-resistant wrought Monel seat rings to assure tightness . . . at oil pressure up to 400 psi.

JENKINS BROS. . . . well-known valve makers . . . have taken another big step ahead with their newly-designed 270-U valve, shown at right.

Look at its seating arrangement!

The wedge is high-quality bronze—strong enough to last through many openings and closures, yet inexpensive and easy to replace.

And for the seat rings—where the constant heavy wear comes—Jenkins Bros. use Monel*. Work hardened to 190 Brinell (2½ times harder than the wedge), the rings will hardly ever have to be replaced. And since they are made of *wrought* Monel, Jenkins is able to hold the price of this new valve in the moderate range.

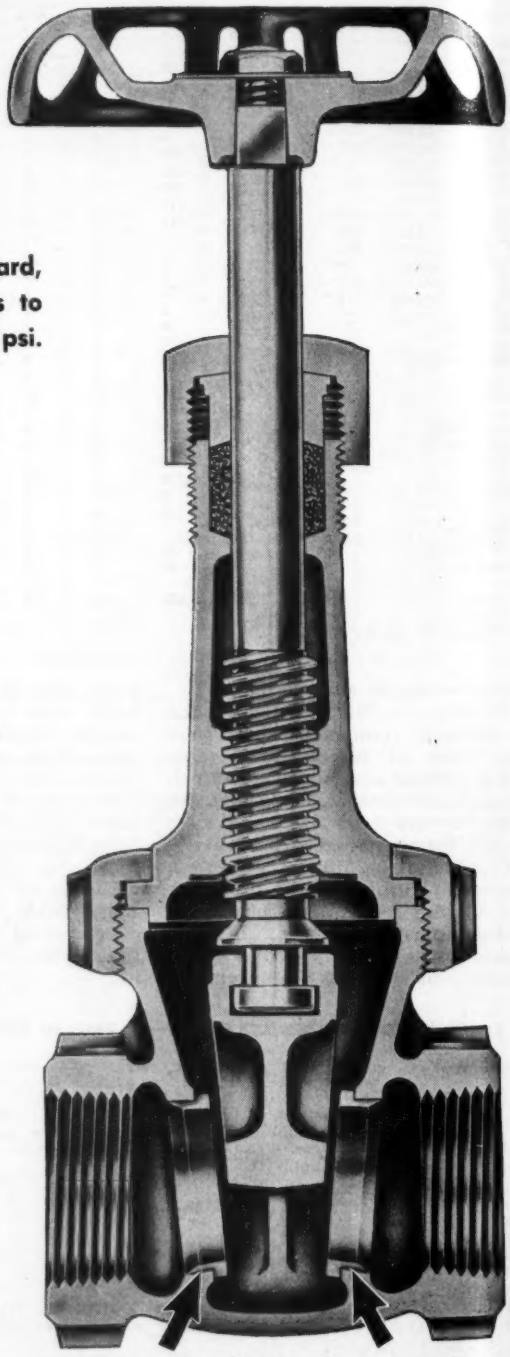
In tests, these seat rings stood up under thousands of openings and closings . . . *without a sign of wear.*

These Monel seats fight corrosion, too . . . another reason why Jenkins especially recommends their 270-U valve for severe conditions, such as those encountered in refineries, dye houses, and chemical, food, and rubber plants. Moreover, the Monel seats are galvanically neutral to the bronze wedge and body metal—even in salt or polluted water.

Let INCO help you

What's *your* metal problem? If it's hardness, corrosion resistance, strength, heat resistance, or a combination of these, it will pay you to find out more about Monel and the other INCO Nickel Alloys.

With INCO, solving metal problems is a privilege. Write us, and we'll assign a member of our Technical Staff to consult with you and recommend the metal best suited to meet your individual needs. *Reg. U. S. Pat. Off.



Cross section of new Jenkins valve. Arrows indicate wrought Monel seat rings expanded into valve body which resist wear and corrosion. Tight-fitting bronze wedge is easily replaced, enabling valve to last indefinitely. Available in ¼" to 2" sizes to handle 200 psi steam or 400 psi water, oil, or gas.

EMBLEM OF SERVICE

NICKEL (INCO MONEL TRADE MARK) ALLOYS

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall Street, New York 5, N. Y.

marked increase in exploratory drilling in 1947, contrasted with 1946, but in a few states (Mississippi, New Mexico) the level remained nearly unchanged, and in Illinois, Montana, and Ohio, there was a marked decrease. In California there was a small decrease (4 per cent).

4. The average depth of hole for all exploratory drilling increased from 3,855 ft. in 1946 to 3,986 ft. in 1947. Most remarkable was the depth of drilling in southern Louisiana where 154 holes averaged 10,178 ft. per hole.

As for several years past, again this year we shall refer to certain data pertaining to the group of 17 states shown in Fig. 2. These 17 states, each year from 1938 to 1947, inclusive, have included between 98 and 99 per cent of the proved oil reserves of the country. For this reason their study gives essentially a picture of conditions in the United States where we want to compare exploration activities and additions of new oil from year to year.

Comparison With A.P.I. Figures

In Table 4 are listed annual statistics comparing the American Petroleum Institute's figures on proved oil reserves with our figures on exploratory drilling. This comparison is suggestive, but it is not quite precise, and for this reason: the estimated "new proved reserves" (Columns C and E) include, for each year, newly discovered proved reserves and also new proved reserves resulting from extensions of pools or fields previously discovered. This new oil by extensions is very largely a result of regular field development, not of exploratory drilling. In fact, some study of this matter leads us to conclude that probably not more than 2 per cent—centainly not more than 5 per cent—of the new proved reserves added by extensions in any given year is attributable to exploratory drilling. It is nearly all to be credited to field-development drilling. However, this "extension oil," each year, is really a followup of the discoveries of several preceding years. In this sense certain fractions of it might be credited to years gone by, but this would involve many serious difficulties. We believe that it is better to refer to the simpler picture as presented in Table 4, keeping in mind that Columns G and I do not actually measure the results of the exploratory effort for any given year.

A question sometimes asked concerns the approximate percentage of true wildcatting (new-field wildcatting) by major companies, on the one hand, and by minor companies and independents, on the other hand. Distinction between these three classes of operator is not always easy, and in some instances the same company may be regarded as a "major" in one district, but as a "minor" in another district. Consequently we left the classification to the judgment of the various committeemen, each for his own district. Usually a major company is defined as one which is integrated with respect to at least three of the four main branches of production, transportation, refining, and marketing.

Our statistics showed that in the country as a whole, 781 new-field wildcats (134 producers and 647 dry holes) were drilled by majors; 2,311 new-field wildcats (225 producers and 2,086 dry holes) were drilled by minors and independents; and 387 new-field wildcats (35 producers and 352 dry holes) were drilled by minors or independents with the drilling financed by major companies. Corresponding figures for the 17-state area were 711 new-field wildcats (126 producers and 585 dry holes) by majors; 2,234 new-field wildcats (217 producers and 2,017 dry holes) by minors and independents; and 380 new-field wildcats (35 producers and 345 dry holes) by minors and independents with the drilling financed by majors.

E. A. Eckhardt, vice president of Gulf Research & Development Co., has returned to Pittsburgh after a trip to the Caribbean.

It must be marked BETTIS*

TO BE A GENUINE BETTIS PROTECTOR

* MADE BY THE BETTIS RUBBER CO.

To get these tough, long-lived protectors in any of their 64 standard sizes—including the new Oil Resistant Protector which gives such phenomenally long service in oil base mud or where well temperatures are high—just ask any of the representatives listed.

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PETROLEUM ENGINEERING SCHOOLS

NO. 18 IN A SERIES

TEXAS COLLEGE OF ARTS AND INDUSTRIES

Mechanical engineering, natural-gas engineering, and chemical engineering buildings at Texas College of Arts and Industries, Kingsville

SALIENT FACTS AND FIGURES

General.—State college, technological, coeducational. Founded in 1925. Situated in Kingsville, approximately 40 miles south of Corpus Christi and 100 miles north of the Mexican border.

Enrollment.—Fall, 1947—2,107.

Matriculation fee.—Residents of Texas, $25 per semester; nonresidents, $150 per semester. Scholarships for $125 per semester are available to qualified residents of countries of Latin America.

Student activity fee.—For all students, $12.50 per semester.

Laboratory fees.—From $2 to $4 per course.

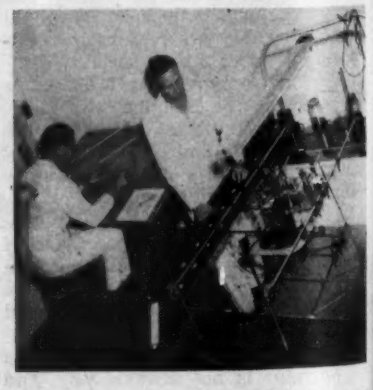
Assistant Professors Emerson Korges and Noyes Livingston, Dr. Frank H. Dotterweich, Associate Professor Vandiver Mooney, and Instructor Alvin Hilbrich

TO supply the demand for technically trained men in the natural-gas industry, natural-gas engineering was added to the courses offered by Texas College of Arts and Industries in September 1935.

This course was added to the division of engineering through the cooperation of the foremost gas companies of Texas. An advisory council, composed of leading men of the natural-gas industry and led by Frank C. Smith, president, Houston Natural Gas Corp., and president of the board of directors of Texas A. & I. College, pioneered the course.

This advisory council, representing the major gas companies in the Southwest, the American Gas Association, and the Southern Gas Association has cooperated with the college by adding equipment to the laboratories and by employing students both as undergraduates during the summer recess and finally as graduates.

Facilities on the campus include three laboratory buildings—a complete natural-gas measurement laboratory; a natural-gas production laboratory supplied with field installations; and a complete natural-gas engineering-process laboratory. In addition, the natural-gas engineering students make regular trips to the oil and gas installations in the vicinity of Kingsville (Stratton-Seeligson fields containing one of the greatest high-pressure natural-gas condensate reserves known), to study current practices and to make their own measurements. Specialized courses offered are: Gas Measurement, Gas and Fuel



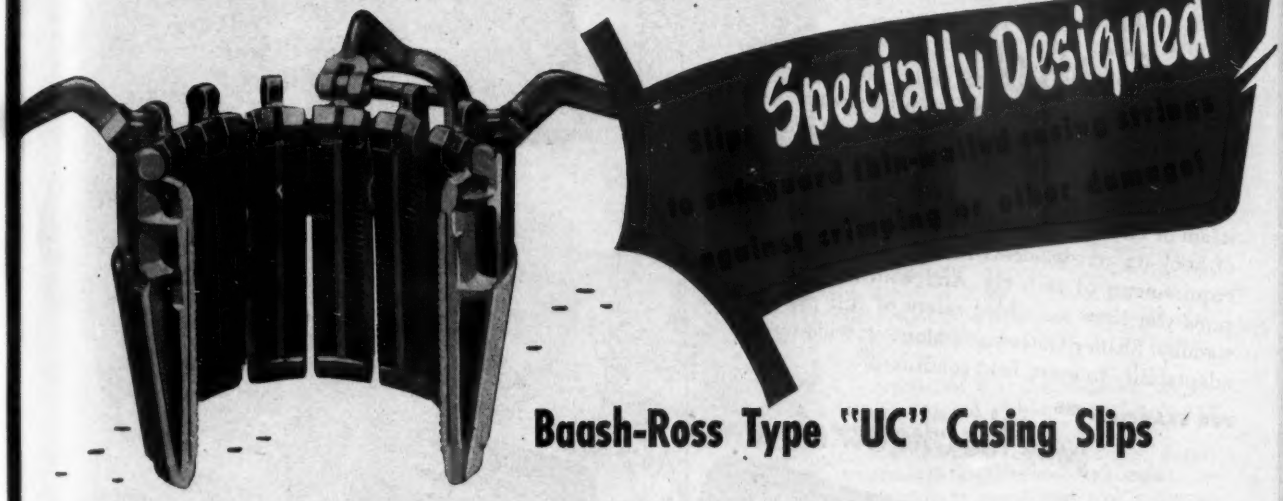
Subsurface gas flow being studied by means of the electrolytic model table by Carl Wilson, presently of Sunray Oil Corp.

Baash-Ross News

BAASH-ROSS TOOL COMPANY · LOS ANGELES · HOUSTON · NEW YORK

OUR 28th YEAR

...and again something new from BAASH-ROSS



Baash-Ross Type "UC" Casing Slips

BECAUSE A STRING of casing has a relatively thin wall in relation to its diameter, it is much more easily damaged by unequal slip pressure than are drill pipe or tubing. Yet the weight of a string of casing—particularly under modern deep-hole drilling operations—can be extremely great... *so great, in fact, that even a slight misalignment of the slips or a moderate concentration of slip pressure can cause serious damage to the casing and might even result in losing the casing string down the hole.*

But such risks are now minimized through development by Baash-Ross of a new type of casing slip—the Baash-Ross Type "UC" Casing Slip. The Type "UC" Casing Slip consists of multiple segments, flexibly linked together so that they *w-r-a-p* around the casing like a chain tong to fit the exact curvature of the casing. Each individual slip segment takes the *same* uniform grip on the surface of the casing because *all* of the segments are unitized together—*act* as a unit, *set* as a unit, *grip* as a unit. This assures uniform slip pressure around the full circumference of the casing, eliminating risk of concentrated pressures that crimp the pipe and egg-shape the casing.

THREE BASIC BODY SIZES HANDLE WIDE RANGE OF CASING DIAMETERS

And here's an important point... Only *three* basic body sizes of "UC" Casing Slips are needed to handle *all* popular casing sizes from 7⅝" through 13⅜". As shown in the accompanying table, interchangeable liners are available for each of the three basic body sizes so that each size can be readily adapted to fit different casing sizes within its operating range...

Basic Body Size "UC" Casing Slips....	13⅜"	10¾"	9"*
Interchangeable liners available to fit.....	13⅜" 11¾"	10¾" 9⅝"	9" 8⅝" 7⅝"

**Fits bore and taper of standard rotary table.*

LINERS EASILY REPLACED

The liners in "UC" Casing Slips have ample length and are so designed that they will cut through pipe scale and any surface coating on the casing to take a firm, slip-proof grip *without damaging the surface of the casing itself.*

And if at any time after long usage, the liners become dull—or when changing from one casing size to another as outlined above—they can be quickly and inexpensively replaced. Simply pull a stainless steel pin, replace the old liner with a new one, slide the pin back in place and the job is done. The stainless steel pins eliminate risk of corrosion and assure easy liner replacements. Furthermore, it is important to note that none of the load of supporting the casing string is placed on retaining pins, bolts or any other parts that can become sheared or lost in the hole. *For maximum safety and strength all weight on the liners is transferred directly to the Slip body itself!*

HERE IS WHY *every casing job needs the protection of Baash-Ross "UC" Casing Slips!*

Because casing has a thin wall in relation to its diameter, it is easily crimped or damaged by even small misalignments that would not affect thicker-walled drill pipe or tubing.

If casing diameters vary slightly or if the slips are not set at exactly the same level, conventional rigid-type slips cause concentrated slip pressure that can crimp, bottle-neck or squeeze the casing out-of-round.

Such damage not only risks dropping the casing string, but the bulged or egg-shaped areas can cause poor joint make-up as well as tight spots through which tools cannot pass. Moreover, wear concentrated on the bulged spot leads to premature casing failures.

The flexible unitized design of Baash-Ross Type "UC" Casing Slips eliminates risk of one portion setting higher or lower than the other... and the multiple narrow segments assure an accurate, safe grip that exactly fits the curvature of the casing.

RESULT—there is no concentrated slip pressure—no misalignment of slip segments—no risk of damaging the thin walls of even the longest and heaviest casing strings!

Type "UC" Casing Slips are light, compact and easy for the crew to handle on even the longest and heaviest casing jobs. And they are so inexpensive that every casing job you run can have the protection of this new slip advancement. Your nearest Baash-Ross representative will be glad to supply full details or write direct.

With SHAFFER CELLAR CONTROL GATES

not only can you vary the type of power, but also the power drive!

Choice of Air—Hydraulic—Steam or Electric Drives . . . plus Remote or Unitized Hook-Ups—all with full manual standby!

Here's one cellar control gate that has virtually no power limitations whatever. Not only can you operate a Shaffer Cellar Control Gate interchangeably with *any* type of power found in today's field operations—air, hydraulic, steam or electric—but you also have a wide choice of hook-up arrangements to meet the individual requirements of each rig. And with all installations you have the added safety of full manual standby. Shaffer Gates stand alone in wide-range adaptability to every field condition!

FOR EXAMPLE, Take the Shaffer air drives

If you want the power drive located *away* from the Gate then this Shaffer Dual Air Motor Drive is the hook-up you want. By means of an air-operated clutch its *single* Shaffer Air Motor will close and open *both* ram assemblies in a Shaffer Double Gate (or *two* Shaffer Single Gates), and it can be located either on the mat or completely outside the rig, from where it operates the rams by means of positive torque-tube drives.

Only two small air valves, mounted convenient to the driller, are needed to control all Gate operations. One valve, connected to the Air Motor by means of two simple pipe lines, operates the Air Motor in either an opening or closing direction.

The other valve, connected to the air clutch by two flexible tubing lines, selects the Gate to be operated . . . and by pre-locating this valve on the Gate desired, only *one* valve need be operated when pressure emergencies occur, reducing control operations to a minimum.

And remember—like all Shaffer Power Drives—this one has the added protection of *full* manual operation (both closing and opening) should power failures occur. The power drive is *automatically* disconnected when not in use, thus eliminating motor drag when operating the Gates manually.

If you prefer to have the power drive close to the Gate here's the Shaffer Air Motor Drive arrangement that fills the bill. On this hook-up a separate Shaffer Air Motor Drive is used for operating each ram assembly of a Double Gate (or for each single Gate), and is side-mounted directly on the Gate body and operates through a positive chain drive. A special air valve for closing and opening the Gate is installed convenient to the driller for operating each Air Motor and its air clutch. Manual closing of the Gates is accomplished in the same manner as in the Shaffer Dual Air Motor Drive described at left . . . and similarly, the Air Motors are *automatically* disconnected when not in use to eliminate drag during manual operation.

This Shaffer advantage of *complete* manual standby—both for closing and opening operations—is particularly important should power failures occur during pressure emergencies. Shaffer alone provides such vital *double* protection to safeguard your wells!

Complete Interchangeability!

Simple to install and completely adaptable, Shaffer Power Drives have the further advantage that they are quickly interchangeable. You can move a Shaffer Cellar Control Gate from well to well, and by simply changing the compact power drive, you can operate the Gate with air, hydraulic, steam or electric power—whichever is most convenient for each installation . . . always with the added safety of manual standby!

Before you buy *any* Cellar Control Gate equipment be sure to get the full story on Shaffer's *many* important advantages. Send for your free copy of the Shaffer Catalog which outlines other vital features.

See the Shaffer section of your Composite Catalog.

SHAFFER

HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT • FISHING TOOLS THAT EXCEL

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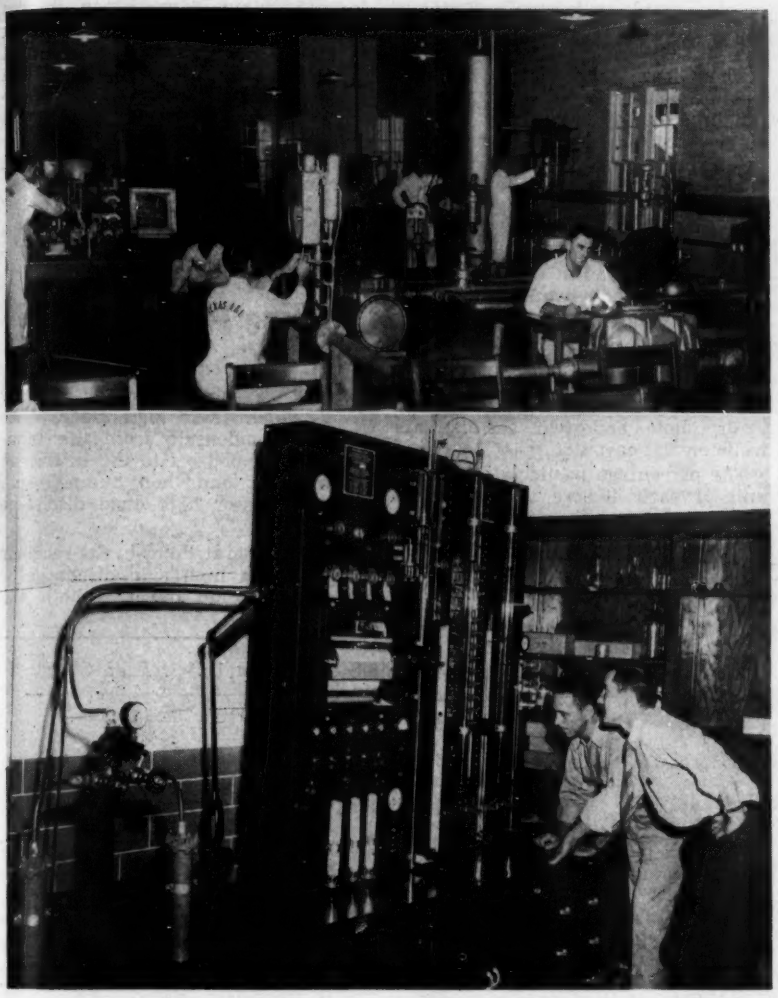

Top: Students at work in a section of the natural-gas production and measurement laboratory. Bottom: The low-temperature Podbelniak column is being studied by James Grimshaw, recipient of the Chicago Corp. fellowship, and Assoc. Prof. Vandiver Mooney

Analysis, Natural Gas and Condensate Production, Natural-Gas Distribution and Transmission, Petrochemical Processes, and Combustion Engineering.

Graduates in 1947 numbered 8, but 16 are scheduled to be graduated in the spring of 1948. Following them are 39 juniors, 42 sophomores, and 52 freshmen.

The faculty consists of Dr. Frank H. Dotterweich, B.E., Ph.D., professor and director of the division of engineering; Assoc. Prof. Vandiver Mooney, B.A., M.A.; Asst. Prof. Emerson Korges, B.S., M.S.; Asst. Prof. Noyes Livingston, B.S., M.A.; Asst. Prof. William Rowland, B.E., B.S.; and Instructor Alvin Hilbrich, B.S.

One of the highlights of the natural-gas program at Texas A. & I. for the past 2 years has been the annual short course in gas technology. Sponsored by the Southern Gas Association and presented by the college, the conferences have, in both 1946 and 1947, attracted approximately 200 representatives of the gas industry from many states. Leading experts in the various phases of gas engineering have conducted lectures and class discussions. Field trips have been taken to gas-production and utilization sites. Last spring the registrants toured the Lower Rio Grande Valley where gas-fired dehydration plants which are developing new uses for agricultural crops were examined.

Gas-turbine design will be featured at the third annual short course in gas technology to be held at the college, June 2, 3, and 4, and an inspection trip is scheduled to the port of Corpus Christi and vicinity.

California Research Corp. Expands Laboratories

(Continued from page 63)

Engineers, scientists, and petroleum technologists find a variety of facilities and a host of experimental projects in motion when visiting the Richmond laboratories. Among the routine or utility facilities are such things as the large stock rooms for chemicals and laboratory supplies containing over 10,000 pieces of glassware of 300 different types for various experimental setups, 5,000 pieces of laboratory equipment, 1,500 containers of organic and 1,200 of inorganic chemicals. Other divisions in this category include the glassware wash room, three cold-storage rooms, a 63-by-90-ft. machine shop, a 5,000-drum storage area, cooling-water units and electrical substations, special equipment laboratory, glass blowing shop.

The research sections contain petroleum-processing laboratories, analytical and physical-measurements laboratories, industrial-lubricants laboratory, chemical processing and petroleum-products laboratory, engine lubricating-oil laboratory, and sections devoted to X-ray defraction and radioactivity counters, spectrographic examinations, catalyst experiments, etc.

Typical of C.R.C.'s research on petroleum and chemical processing projects are:

Manufacture of synthetic detergents.—This is one of the outstanding products developed by California Research in recent years. The product is sold in large quantities by Oronite Chemical Co., an affiliate.

The basic raw material is alkane, a product synthesized from petroleum. In the detergent-manufacturing process, alkane is treated with a sulfonation agent and the resulting sulfonic acid is neutralized with caustic. The product of neutralization is the synthetic detergent which is ordinarily compounded with other ingredients to form a finished product for the particular use intended.

"Oronite Detergent" from the commercial plant is marketed in bulk in either the form of slurry or dry powder in the form of spray dried beads or drum-dried powder. Various marketers of soap and detergents sell products containing this material under their own brand names and formulations.

Manufacture of phthalic anhydride.—The laboratory apparatus for this consists of a simplified small-scale reactor capable of preparing phthalic anhydride from ortho-xylene by the same process used in the commercial plant. In the lab unit ortho-xylene, which is obtained from petroleum, is pumped into the vaporizer. Air meets the xylene in the steam-heated vaporizer after which the vaporized mixture of xylene and air passes through the catalyst bed in the reactor where the ortho-xylene is partially oxidized or burned to give phthalic anhydride.

The hot gases which issue from the base of the reactor are cooled in the glass condenser causing phthalic anhydride to crystallize. Crude phthalic anhydride is then purified by distil-

lation. The final product (in the commercial plant) is then melted, flaked, and packaged. The process was developed by C.R.C.

In one chemical products laboratory unit which is a part of the "surface active agents evaluation" laboratory, work is done to obtain performance tests of surface-active agents. These agents can be classed into three groups by surface active phenomena: (a) detergents, (b) foaming agents, and (c) wetting agents. Some agents may exhibit two or all three of these phenomena.

The tests performed by the lab are designed to measure (a) detergency tests—detergency, or the ability to remove soil; (b) foaming—ability of a detergent to produce and keep on producing foam; and (c) wetting agents —utilized to obtain rapid penetration of a water solution. One of the principal uses of such materials is in the dyeing of fabrics.

Standard of California's first activities in the field of research and development were inaugurated in 1919 with the organization of a relatively small group of research personnel in the Richmond refinery. This original group has been expanded many fold, and later was made a separate department along with the patent division. This work then was consolidated as a subsidiary, with California Research Corp. being incorporated in 1944.

Newest Unit Project

(Continued from page 65)

protects the royalty holder in the event the well or wells he is interested in deplete quickly, go to water, or have to be plugged for any reason whatsoever.

With the royalty owners' association kept fully informed at all times, the preparation of the plan of unitization proceeded smoothly. Things were so well organized that less than 2 hours was required to present all the evidence before the Corporation Commission. The president of the Southwest Antioch Royalty Owners' Association and some of the members were present at the hearing, but acted only as observers, entering no objections to the unitization.

The royalty owners didn't have to wait long to realize benefits from the unitization. Immediately following the announcement of unitization by the Corporation Commission, royalty prices jumped on an average of $250 per acre, according to one interested person.

Long-range benefits from the unitization will be considerable, according to testimony presented during the hearing. Engineers estimate that 20,000,000 to 23,000,000 of the 50,000,000 bbl. of oil originally in the reservoir will be recovered under unit operation. This compares with approximately 12,000,000 bbl. estimated to be recoverable under the best-known competitive pressure-depletion methods.

The Gibson sand, from which the field produces, is found at a depth ranging from approximately 6,250 ft. on the east side of the field to 6,700 ft. on the west side. Field is a monoclinal structure dipping to the west and south of west. Geologically, the pool is on the southwest flank of the Pauls Valley uplift, and is a stratigraphic trap found at the intersection of a lower Pennsylvanian sand with the southwest dipping unconformity at the base of the Pennsylvanian system. The field is still developing to the north and south. One dry hole has been drilled on the west side and a dry hole and two gas-distillate wells on the east side.

The percentage participation in the unit of each 40-acre tract with its one well was determined by attributing 50 per cent of the interest to the acre-feet of productive Gibson sand under each 40 acres and 50 per cent to a productive factor, using the formula below:

$$100\left(\frac{1}{2}\,\frac{\text{Acre feet of net productive Gibson sand of well on tract}}{\text{Summation of all tracts productive acre feet}} + \frac{1}{2}\,\frac{\text{Productive factor of well}}{\text{Summation of all tracts productive factors}}\right)$$

The "productive factor" used in the above formula is the lesser of (a) or (b) below.

(a) The oil production accompanying the production of 375 M.c.f. of gas per day (150 bbl. of oil per day times 2,500 cu. ft. per barrel limiting ratio);

(b) As much thereof as the well is capable of producing in 24 hours but in no event in excess of 150 bbl. of oil daily.

Gas Injection by May 1

In accordance with the plan of unitization it is hoped that facilities will be in readiness to begin gas-injection operations by May 1. It is probable that the major portion of the gas will be injected into the east side—which is structurally high and contains high-gas-oil-ratio wells.

A compression plant is presently under construction in the field by Warren Petroleum Corp., Tulsa. This plant, with a capacity of 22,500 M.c.f. of gas daily, will furnish gas for the injection program. Coowners of the plant, with Warren, are Carter Oil Co., Cities Service Oil Co., J. E. Crosbie, Inc., and Sinclair Prairie Oil Co.

Initially this plant will pick up gas from the field at trap pressures of 25 to 50 psi., boost and strip it of gasoline and L.P.G. with 750 psi. absorber pressure, and then raise the dry gas to 2,250 psi. for reinjection. Plant horsepower is 7,200 and the gasoline and L.P.G. yield is estimated at 40,000 to 50,000 gal. daily. When the large gasoline plant, which Warren has under construction at Maysville, is completed (estimated completion date—January 1949) the Southwest Antioch plant will become a remote absorber for the larger unit. Mineral seal oil will be circulated through the Antioch plant to absorb the desired fractions from the field gas.

New Midget Gasoline Plant

(Continued from page 78)

the low-pressure gas into a separator from which their high stages take suction. Condensate from the separator is trapped off to the interstage accumulator and then pumped into the compressor high-stage discharge line.

Liquid separated out in the receiver tank on the high side discharge is pumped off and bypasses both the absorber and the still, going directly to the primary fractionator.

Suction to the low stage of the two single-compressor units is from the still. Discharged gases and vapors from the low side of the compressor are cooled and delivered into a separator; condensate is trapped to the interstage accumulator. High-stage suction for the single units is taken from the separator. The discharge side of the high stage delivers gases and vapors into a special separator vessel in which the condensate mingles with field high-stage condensate and is pumped from the special vessel to the primary fractionator. Vapors and gases from the special separator, taken off in two different streams, are delivered to the absorber at different points in the column. The fractionating section of the plant is designed along conventional lines.

Net residue is split up three ways with the larger volume returning to the field for various uses. Plant fuel is taken off of the residue-gas stream and the remainder of the residue over and above that used in the field and for fuel purposes is flared. Residue gas is recycled for pump operation and for still agitation.

Shown in the accompanying schematic diagram is the arrangement of the process as installed in Coon Creek field. The process is licensed by Otha H. Grimes, Tulsa., L. S. Gregory Co., Tulsa, is engineering and sales representative.

O'Sullivan——"America's No. 1 Heel and Sole" selects

PERBUNAN

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BECAUSE *"We tried every oil resistant material available and we found Perbunan could be finished to the right degree of hardness and still have sufficient high and low temperature flex resistance in presence of oil" . . . writes J. M. Mason, Vice President, O'Sullivan Rubber Corporation.*

BECAUSE with this new O'Sullivan line, working shoes can now have heels and soles that gasoline and oil *cannot penetrate*—as happens with leather.

BECAUSE Perbunan Nitrile Rubber will not deteriorate or swell after contact with gasoline or oil—as happens with natural rubber.

BECAUSE Perbunan heels and soles keep their safety-grip qualities *longer* than natural rubber.

IF YOU have problems that could be solved by a rubber that not only resists oil, weather extremes, abrasions and wear . . . but also *holds* delicate colors—write our nearest office!

PERBUNAN
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QUESTIONS on TECHNOLOGY

by W. L. Nelson

Consulting Engineer

Pressure Drop in Small Tube Stills

Note: The highly pertinent question: "What is the pressure drop in a pipe still and how is it computed," arose in March (30) 1944. Since no simple answer or explanation could be given, a series of charts of pipe-still pressure drops has been appearing on the Questions on Technology pages. Here are others.

Pipe stills for heating stocks that are discharged into an atmospheric pressure tower (topping, rerunning, naphtha distillation, reboiling, etc.) were investigated by graduate students at University of Tulsa. Stocks whose distillation curves exhibited the following slopes (°F. increase in distillation temperature per 1 per cent distilled) were presented on this page:

Slope, °F./per cent	Issue of The Oil and Gas Journal
9.4	Aug. 31, 1946, page 91
7.0	July 5, 1947, page 93
4.0	Nov. 29, 1947, page 89

for the following general operating conditions and kind of pipe still.

VELOCITY, based on 60° F., ft./sec.	1.87
TUBE SIZE, in.	3 x 4
Charge rate, bbl. per day	2,000
Tube length, ft.	15
Return bend, equivalent ft.	15
Transfer line length, ft.	70
Transfer line length, equivalent ft.	100
Inlet temperature, °F.	400
Feedstock, A.P.I. (mixed base)	37
Feedstock, mid b.p., °F.	600
Tower pressure, psig.	6
Radiant absorption rate, B.t.u. hr. for 1 sq. ft. projected area	25,000
Efficiency, per cent	77

TABLE 1—PRESSURE DROPS IN PIPE STILLS, PSI.

Slope of stock °F./per cent	Vaporization of tower: 30 per cent 2 in. i.d.	30 per cent 3-in. i.d.	45 per cent 2-in. i.d.	45 per cent 3-in. i.d.	60 per cent 2-in. i.d.	60 per cent 3-in. i.d.	75 per cent 2-in. i.d.	75 per cent 3-in. i.d.
4	50	10	81	20	100	32	...	44
7	..	17	126	34	198	55	270	74

TABLE 2—PERCENTAGE VAPORIZATION IN STILLS HAVING 2 AND 3-IN. I.D. TUBES, BEING FED WITH A STOCK OF SLOPE 7.0

Distance from tower, ft.	Vaporization at tower: 30 per cent 2-in. i.d.	30 per cent 3-in. i.d.	45 per cent 2-in. i.d.	45 per cent 3-in. i.d.	60 per cent 2-in. i.d.	60 per cent 3-in. i.d.	75 per cent 2-in. i.d.	75 per cent 3-in. i.d.
zero (tower)	30	30	45	45	60	60	75	75
100 (still outlet)	..	15	20	30	31	42	45	54
200	..	3	7	15	18	27	30	40
300	..	0	0	6	9	17	20	29
400	..	0	0	0	2	9	12	20
500	..	..	0	0	0	2	6	11
600	..	..	0	0	0	0	1	4
700	..	..	0	0	0	0	0	0

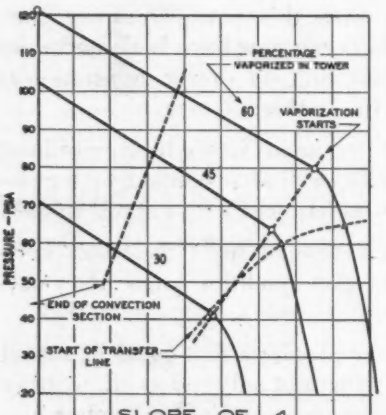

Fig. 1—Pressure drop in high-velocity pipe stills—2,000 bbl. per day of a stock of slope 4.0, in 2-in.-i.d. tubes

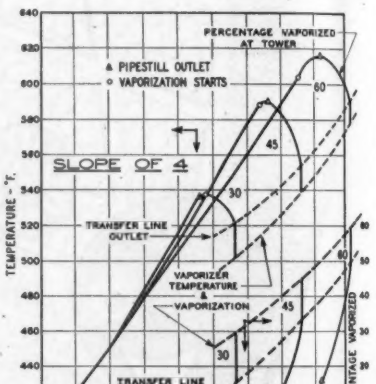

Fig. 2—Temperature and percentage vaporized in pipe stills—2,000 bbl. per day of a stock of slope 4.0, in 2-in.-i.d. tubes

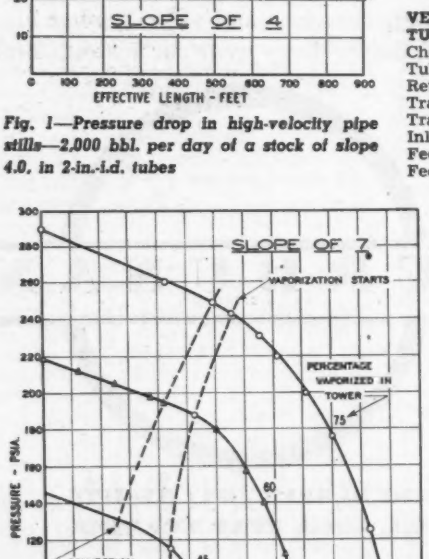

Fig. 3—(Left) Pressure drops in high-velocity pipe stills—2,000 bbl. per day of a stock of slope 7.0, in 2-in.-i.d. tubes

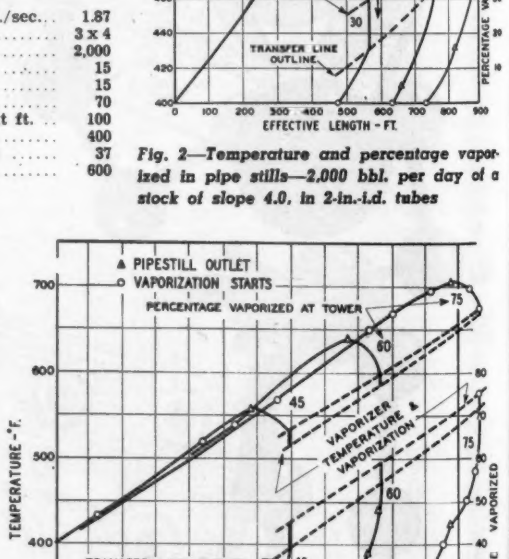

Fig. 4—(Right) Temperature and percentage vaporized in pipe stills—2,000 bbl. per day of a stock of slope 7.0, in 2-in.-i.d. tubes

Small-Tube Stills

The new charts and information presented here are for stills and stocks similar to those mentioned

above except that an inside tube diameter of 2 in. was used rather than the 3 in. presented heretofore. This increases the cold (60° F.) velocity to 4.2 ft. per second rather than the 1.87 ft. per second studied heretofore.

The two sets of curves shown here are:

Slope, °F./per cent	Figures
4.0	1 and 2
7.0	3 and 4

The main differences between the small-tube (2-in. i.d.) pipe stills and the more conventional stills equipped with 3-in. i.d. tubes (The Oil and Gas Journal, July 5, 1947, page 93, and November 29, 1947, page 89) is the suppression of vaporization that occurs in the small-tube pipe stills, and the larger pressure drop that occurs in them. The pressure drops for the two stills are shown in Table 1. Thus, the pressure drop through 2-in. i.d. stills is 3 to 5 times as much as in 3-in. i.d. stills.

Although the liquid velocity in the small-tube pipe stills is larger than in the 3-in. i.d. stills, the velocity in the outlet tubes of the larger-tube stills is much higher than in the 2-in. i.d. stills. This is caused by the large amount of vaporization in the large or 3-in. i.d. tubes, or stated conversely, it is caused by the suppression of vaporization by the 2-in. i.d. tubes. Vaporization is almost totally suppressed in the transfer lines of the 2-in. i.d. stills when the feedstock has a slope of 4.0. Table 2 shows the percentage of vaporization in the two stills when handling a material of slope 7.0. Similar data on stills handling materials of slope 4.0, indicate even a greater suppression of vaporization by the 2-in. i.d. tubes.

The temperature attained and the shape of the temperature curve is not much affected by the tube size. The highest temperature attained is, however, about 25° F. higher for the small tube (2-in. i.d.) pipe stills.

Natural Gas, Coal, Oil Shale as Sources of Fuels

(Continued from page 70)

From the standpoint of the investment figures as presented, it will be noted that the over-all investment cost for producing synthetic gasoline by the several routes outlined is approaching that required for conventional crude refining. Steel requirements for gasoline from crude oil, natural gas, and oil shale are essentially equal and about 50 per cent higher than indicated for the coal plant. This is largely a reflection of the low steel requirement for mining coal and the proximity of many eastern and middle-western coal deposits to consuming markets, thus eliminating pipe lines.

Approximate costs for gasoline on the basis of processing to maximum yield of gasoline appear in Table 4. In the case of crude oil and natural gas, the gasoline cost includes 5 per cent amortization and 10 per cent for return on the investment for manufacturing and on that part of the transportation investment peculiar to the plant. Such capital charges for crude and natural-gas production are included in the prices charged the processing plants for these materials. The gasoline cost for coal and oil shale include 5 per cent amortization and 10 per cent return based on both mining and manufacturing investments, as well as on transportation of raw shale oil. Other transportation costs are based on normal charges.

Crude oil has been charged at its present level in the United States Gulf with normal transportation charges to the refinery. Natural gas has been taken at 10 cents per thousand cubic feet in the field. Coal costs were derived from information furnished by Pittsburgh Consolidation Coal Co. and assume some advances in underground mining techniques. The figure for shale mining was taken at $1.00 per ton. This figure is based on studies by the Bureau of Mines but may be somewhat higher than the figure it would pro-

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pose. For the purpose of this study alcohols and ketones from hydrocarbon synthesis of natural gas and coal were included in the gasoline pool.

It will be noted that the production of the high-quality gasoline from natural gas, based on a price of natural gas at 10 cents per thousand cubic feet, compares quite favorably with production of gasoline from crude oil. The estimated costs for producing gasoline from coal and oil shale are somewhat higher. The costs in all cases are based on producing a gasoline of higher antiknock quality than present premium gasoline. The antiknock level assumed would about satisfy a 10 : 1 compression engine.

The figures on oil from coal in this table are for a location in the East. If complete housing is required, the investment per barrel per day of gasoline might increase about $2,900 and might add up to 1.9 cents per gallon to the cost of gasoline. For locations west of the Mississippi River, the coal available is normally of lower heating value and hence more coal is required per unit of gasoline produced. Additional costs will also be incurred for processing coals having high moisture contents. Furthermore, western plant locations will most likely require extensive housing as well as transportation facilities for products to main consumption points. These factors all lead to somewhat higher investments and costs for oil from western coals.

In the case of oil shales, the Colorado location would demand complete housing to the extent of about $900 per barrel per day of gasoline and might add up to 0.6 cent per gallon to the cost of gasoline.

A second comparison of approximate investments and steel requirements between the processes is presented in Table 5 and expressed in terms of total liquid fuels produced. In this comparison, crude oil and hydrogenated shale oil are processed to maximum yield of middle distillates with minimum production of heavy residual fuel oil, the yield of total liquid products representing about 95 per cent of the oil charged.

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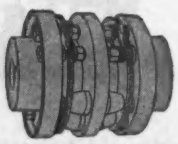
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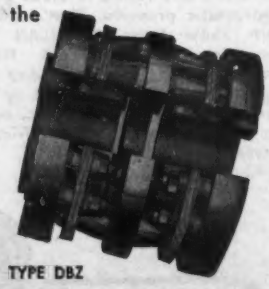
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Casing Strain After Cementing

(Continued from page 72)

on the inside of uncemented sections of casing and where the drill string was not provided with effective rubber protectors. Proof of this theory is that such types of failures were eliminated, and are practically unheard of today, with the almost universal use of adequate protectors. Another bit of evidence against last-engaged-thread failures being a result of tension is the fact that tension failures are always "jumpouts." The pipe threads neck down and jump out of the coupling and only once in a blue moon does the failure occur at the root of a thread.

Assumption 5. — Until within the last decade there did seem to be some scientific reasoning involved in this assumption, that high-tension loads tended to cause leakage in V-thread types of casing joints. It seemed very reasonable that, as longitudinal strain increased, the radial component of the longitudinal force caused the mating threads to slide, one over the other, and allow leakage through the gradually separating male and female elements. This theory has been proved erroneous and at least two large pipe companies have conducted comprehensive tension-internal pressure experiments which proved very conclusively that, up to the yield strength of the metal under the last engaged thread (which is close to the failure point), there is no more tendency for a casing connection to leak at high-tension loads than at zero load. (See A.P.I. Drilling and Production Practice for 1941, pages 243-273.)

To recapitulate, then, what justification is there for letting off tension in casing after cementing?

Tension, even very close to the failure point, will not be inimical. It is a poor engineer who has not calculated a tension safety factor of at least 1.6, and more often in the order of 1.8 or more. And, too, these factors are based on the string hanging in air and yet it is always buoyed up with

a liquid, usually a 10 to 12-lb. mud.

High tension will **not** make joints less resistant to leakage.

The true position of the freeze point is rarely known. It may be at the top of the cement or several thousand feet above it. Very often it is not a fixed point.

We can seldom guess what the internal pressure conditions will be, nor will they be constant.

Sometimes pretty good predictions can be made as to subsequent temperature conditions, since bottom-hole or top-hole chokes can be decided upon in advance, but a change in decision could easily make the difference between having a string of casing in very mild tension, at the freeze point, or in dangerously high compression. Why take a chance?

A final consideration, on which little or no experimental data are available, is the effect of tension on resistance to internal pressure of a tubular section. According to one curve of biaxial stresses there is an **increase** in resistance to internal pressure up to 50 per cent of the yield strength of the material. From there on the resistance decreases until at 100 per cent of the yield strength in tension the resistance to internal pressure has dropped to only 52 per cent of normal. This is known as the "Maximum-Strain-Energy Curve." (See A.P.I. Drilling and Production Practice for 1940, page 136.)

According to another curve, more widely accepted, the resistance to internal pressure rises to about 116 per cent of normal at some 60 per cent of the yield strength, in tension, and only drops off to normal at 100 per cent of the yield strength. This is the "Maximum - Shear - Strain - Energy Curve." (See A.P.I. Drilling and Production Practice for 1939, pages 392-420.)

The latter curve fits very closely a group of actual tension-collapse and compression-collapse determinations and it is logical to expect that the tension-burst quadrant of the curve would also fit actual experimental results, all of which merely goes to indicate that one need not fear premature bursting failures where casing is held in high strain. In fact, there is good reason to believe that it is a very desirable condition.

Possibly future data bearing on this strain problem will reopen the issue, but, with due consideration to all presently known factors, it seems that **the safe procedure would be to land the casing in the casing head at exactly the position in which it was hanging on the hook when the cement plug hit the bottom.**

The writer wishes particularly to thank C. V. Millikan, of Amerada Petroleum Corp., for his constructive criticism of this article.

Discussion

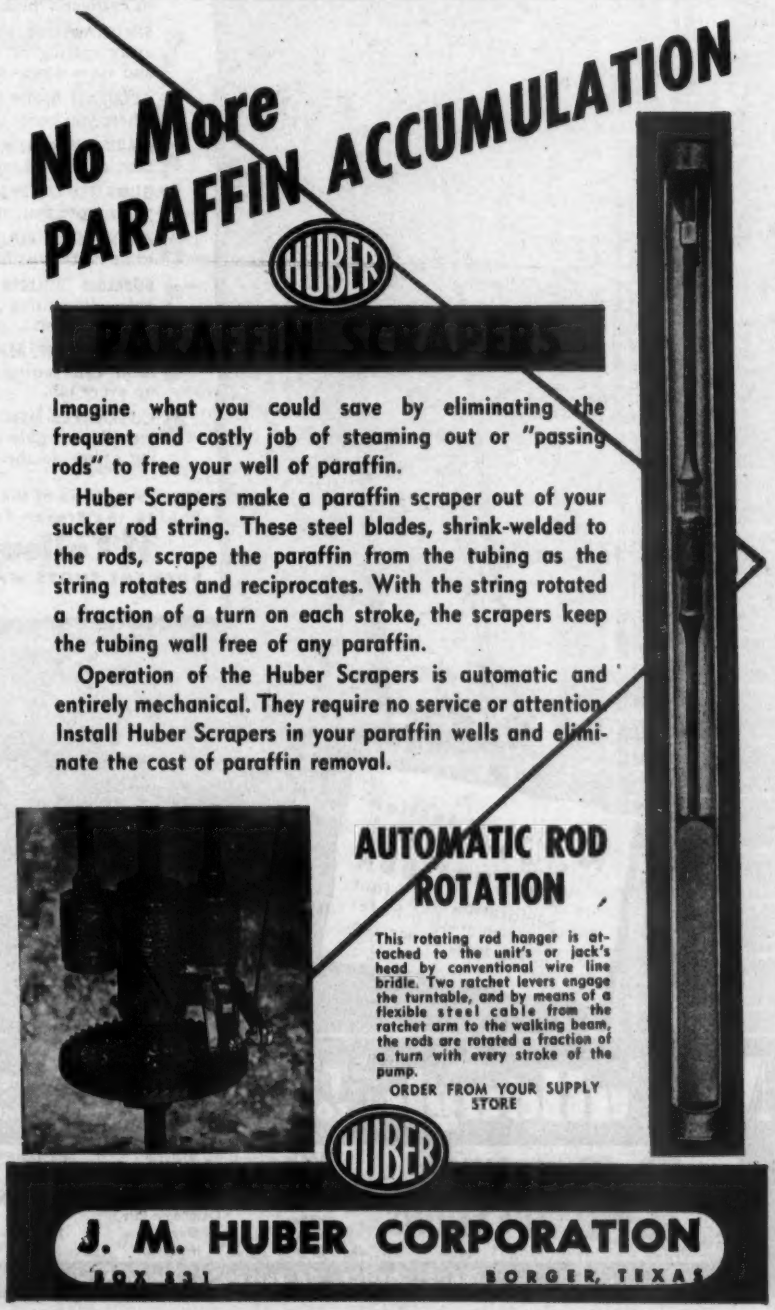
C. J. Kerwin* and J. J. Arpst, in commenting on a proof of this article, suggest that occasionally it may be necessary to pull up some extra tension. This would be true only when a relatively small part of the pipe is cemented and when such a well is producing large quantities of water.

For example, with only 1,000 ft. cemented the unit strain at the freeze point would be 3,400 psi. (±), neglecting buoyancy, which would require only a 16.4° increase in temperature to reach the zero point. Any further increase would create compression conditions at the freeze point. Similarly, 2,000 ft. of cemented pipe would require only a 32.8° increase in temperature and 3,000 ft. a 49.9° increase.

They suggest, furthermore, that probably some extra tension should be pulled if the anticipated average temperature rise of the upper section, in degrees Fahrenheit, is more than the length of the cemented section (in thousands of feet) times 15. Or, to be on the safe side, possibly the factor should be 10.

With the above comments the writer is in accord, but would emphasize that they apply only to very rare instances.

*General superintendent, and †chief engineer and assistant general supt., both with British-American Oil Producing Co.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ENGINEERING *fundamentals*

Capillary Pressure—
The Straight Capillary

WHEN a discontinuity of phases exists within a capillary system there will be a pressure drop at the phase boundary. This pressure discontinuity is known as the capillary pressure, a term which has become fairly common recently in petroleum engineering. The present discussion will define and outline some of the properties of the term.

Capillary pressure is defined as the pressure drop existing between any two liquid phases, both of which are static, in a capillary system. Thus, in a reservoir we may be concerned with the capillary pressure between oil and water, between oil and gas, or between water and gas. The magnitude of the pressure drop expresses the magnitude of the capillary forces. The usual designation of capillary pressure is P_c, it being understood that a definite pair of phases is considered.

The idea of a pressure drop existing across a phase boundary merely because of the presence of the boundary may be difficult for the initiate to grasp. It can be elucidated by referring to Fig. 1, in which is represented the rise of water in a capillary tube. In this case there are two phases, water and air, within the capillary system. The capillary pressure is $P_c = P_a - P_w$, where P_a and P_w are the pressures on either side of the boundary in the air phase and in the water phase respectively. It can be shown that a pressure drop does exist and its quantitative expression can be determined as follows.

At the point A within the capillary the pressure is the same as that at the point A′ outside the capillary, which pressure is atmospheric, P_a. At the point B, just under the meniscus within the capillary, the pressure is equal to that at A within the capillary minus the head of water. The pressure at B is, therefore,

$$P_w = P_a - h\rho g \qquad (1)$$

where h is the height to which the water has risen and ρ is the water density. Now at the point B′, just above the meniscus within the capillary, the pressure is P_a, the same as that at A′. This statement can be made because the density of the air can be neglected. The pressure across the meniscus (or phase boundary) is, therefore, $P_a - P_w$, or,

$$P_a - P_w = h\rho g \qquad (2)$$

which quantity is the capillary pressure, P_c.

In Engineering Fundamentals No. 325 it was noted that the quantity h could be expressed by the surface tension, γ, and the contact angle, θ, in the relationship

$$h\rho g = \frac{2\gamma\cos\theta}{r} \qquad (3)$$

Therefore, the capillary pressure for the situation under discussion is

$$P_c = \frac{2\gamma\cos\theta}{r} \qquad (4)$$

It will be noted that the pressure is smaller in the water phase and water is the fluid which wets the capillary. This is a general consideration. In this particular case the magnitude of P_c could have been determined by evaluating the force causing the fluid to rise and expressing it as a force per unit area, i.e., a pressure.

These considerations are still valid when applied to the capillary containing oil and water as in Fig. 2. However, the pressure at B′ is now equal to that at A′ minus the head of oil, because the oil density is not negligible compared to the water density. The resulting expression for pressure drop across the interface is,

$$P_o - P_w = h\,(\rho_w - \rho_o)\,g \qquad (5)$$

but the resulting evaluation for capillary pressure is still as given by equation 4 with $\gamma_{o\text{-}w}$, because the fluid rise in this instance involves the differential density $(\rho_w - \rho_o)$. It will be found that Equation 4 is a valid equation for expressing the capillary pressure between any two fluids in a straight capillary tube if γ expresses the boundary tension of the two fluids considered. Capillary pressure may be positive or negative. The sign of the capillary pressure merely expresses in which of the phases the pressure is lower. This phase will always be that which wets the capillary.

Equation 4 shows that the capillary pressure is inversely proportional to the radius of the capillary. Thus, across a fluid boundary which is within a larger vessel, for example, the capillary pressure will be zero, or substantially so, because r becomes infinitely large.

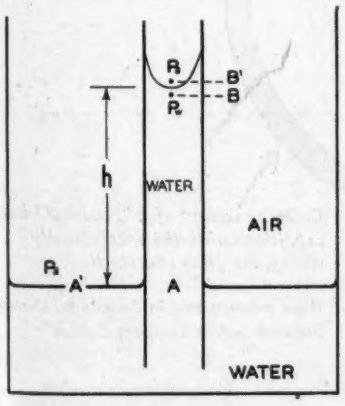

Fig. 1

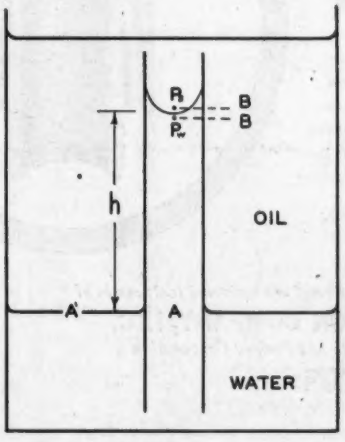

Fig. 2

Series prepared by Dr. John C. Calhoun, Jr., Petroleum Engineering School, University of Oklahoma

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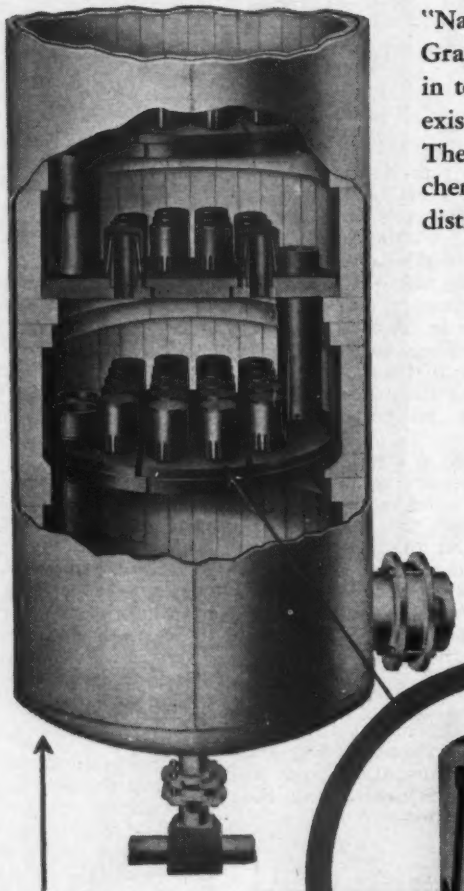

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The Refiner's Notebook

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ALLOWABLE pressures are based on A.S.A.-B31 (Code for Pressure Piping). Section 3 applies to all refinery oil and gas piping and for natural-gasoline plants. Thickness is computed by the following formula (Section 3 only):

$$t_m = \frac{PD}{2S} + C = \frac{PD}{2 \times 12{,}000} + C$$

t_m = minimum wall thickness, inches (nominal pipe size thickness are larger by t_m/0.875 to care for irregularities in manufacture).

P = maximum internal pressure, psi. (internal minus external pressure).

D = outside diameter, in.

S = allowable stress in material, psi. (12,000 for oil at 750° F., Section 3).

C = allowance for threading, mechanical strength, and/or corrosion.

The allowable metal stress (S) is based on Grade A seamless steel. If Grade B seamless steel is specified, the maximum internal pressure can be increased by about 28 per cent. For oil piping outside of refinery limits and at 100°F., the allowable metal stress may be raised from 12,000 to 24,000 psi.

Similar data for Schedule 80 (nearly extra-heavy) pipe will appear in Refiner's Notebook 194.

TABLE 1—ALLOWABLE PRESSURE IN OIL REFINERY AND NATURAL GASOLINE PLANT PIPING

Nominal pipe size (in.)	Outside refinery limits	Maximum allowable working pressure, psi.							
	100° F.	100° F.	300° F.	500° F.	700° F.	750° F.	800° F.	900° F.	1,000° F.
Screwed Joints†									
⅛	3,500	2,540	2,340	2,170	1,860	1,750	1,360	875	437
¼	2,930	2,120	1,960	1,820	1,555	1,465	1,140	732	366
⅜	2,530	1,835	1,700	1,570	1,340	1,265	985	632	316
½	2,190	1,590	1,470	1,360	1,160	1,095	850	547	274
¾	1,910	1,385	1,280	1,185	1,010	957	745	478	239
1	1,690	1,220	1,130	1,045	895	845	658	422	211
1¼	1,590	1,150	1,060	985	840	795	620	397	199
1½	1,440	1,040	965	890	760	720	560	360	180
2	1,315	950	880	815	695	657	511	328	164
Welded Joints‡									
3	1,925	1,375	1,280	1,170	1,035	950	785	475	235
3½	1,795	1,280	1,185	1,090	965	885	735	440	220
4	1,700	1,215	1,125	1,030	915	840	695	420	210
5	1,530	1,090	1,010	925	820	755	625	375	188
6	1,430	1,005	945	865	770	705	585	350	176
8	1,305	935	865	790	700	645	535	320	161
10	1,215	870	805	735	655	600	495	300	150
*12	1,155	825	760	700	620	570(524)*	470	285	142
*14 o.d.	1,145	820	755	695	615	565(477)*	465	280	141
*16 o.d.	1,175	840	775	710	630	580(417)*	480	290	145
*18 o.d.	1,185	845	780	720	635	585(371)*	485	290	146
*20 o.d.	1,135	810	750	690	610	560(334)*	465	280	140
*24 o.d.	1,115	795	735	675	600	550(278)*	455	275	137

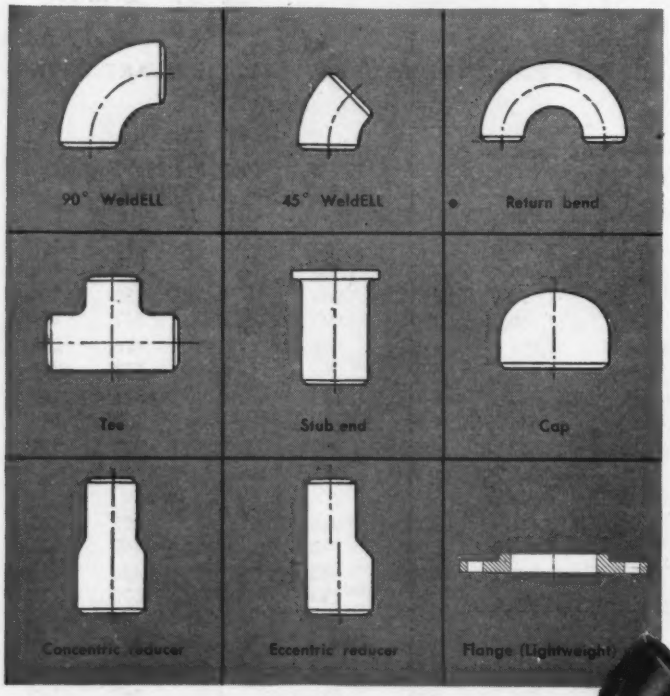
*Standard is thinner than Schedule 40 pipe at sizes larger than 12 in. See 750° F. column for representative working pressures of old standard pipe. †Values of C—⅛ in. 0.03, ¼-⅜ in. 0.044, ½-¾ in. 0.057, 1-2 in. 0.07. ‡Value of C for welded joints, 0.05.

No. 191 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

Name the problem—

- *High temperature*
- *Low temperature*
- *Product purity*
- *Corrosion resistance*

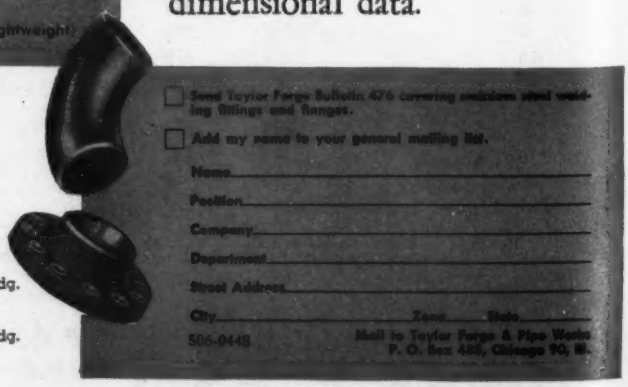
Here's the answer!



Taylor Forge Welding Fittings and Flanges are available in:

Stainless 304, 316, 347, Monel, Inconel, Nickel, Copper . . . also other usual industrial metals.

Fitting sizes: ¾" through 12" and larger. Wall thicknesses: schedules 40-S, 80-S, 10-S and others. Flange sizes: ¾" through 30" and larger. Coupon brings dimensional data.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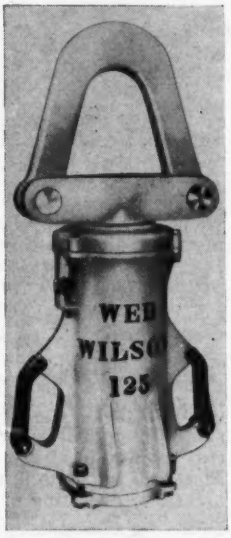
OIL AND GAS EQUIPMENT Digest

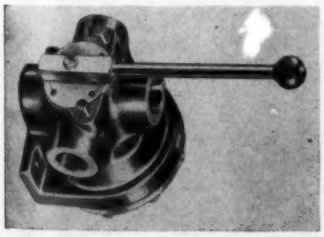
IT'S NEW CHECK IT

by John M. Spears

(1) 125-TON CONNECTORS eliminate all load-carrying threads. In place of the threads a shear ring has been incorporated on the main shank. The heat-treated, alloy-steel shear ring gives extreme strength and simplifies assembly and disassembly in the event repairs are required. Connectors are designed for their rated capacity with a safety factor of four to one. Length of connectors is kept to the minimum to allow ample working room in the derrick or mast. Also, connectors are designed for direct connection to the bottom of most makes of traveling blocks. A simple, positive locking device, consisting of only three parts, locks the connector in any of eight different positions. The lock may be operated from the derrick floor by a hook rod furnished with each connector. *Web Wilson Oil Tools, Inc.*



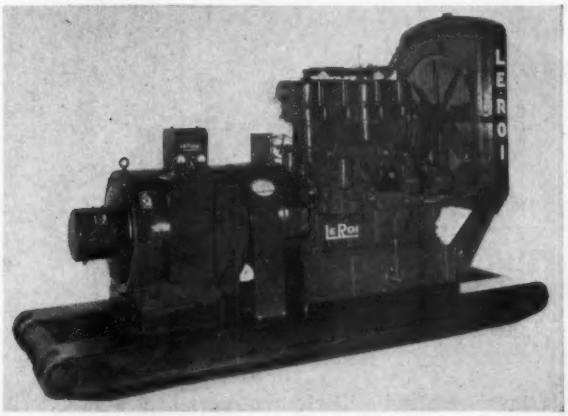
IT'S NEW CHECK IT



(2) FOUR-WAY SELECTOR VALVE features low handle load, ball-bearing construction, and rugged stops and balanced detents for all three operating positions. A force of only 35 lb. on the 12-in. handle actuates the valve at 5,000 psi. pressure. Designed for corrosion-resistant service with water, oil, or gas, valve has a forged-steel body with heavy-duty construction throughout. It employs "shear seal" principle which provide a metal-to-metal seal that is self-aligning and automatically compensates for wear. Valve is not critical to dirt because foreign materials are wiped away instead of lodging between surfaces. Valve has only one basic moving part. May be serviced without removing from lines. Requires no lubrication or packing adjustment throughout its life. Valve is made for 1½ in. pipe. *Saval Co.*

IT'S NEW CHECK IT

(3) PACKAGED OIL-FIELD GENERATOR UNIT consists of a LeRoi engine direct connected to a generator. Engine uses natural gas, butane, or gasoline for fuel. This engine-powered generator produces from 50 to 100 kw. at



a fixed speed of 900 r.p.m. Unit is offered in several sizes, either mounted on portable skid base of heavy steel or stationary mounted in fixed position. Drillers have adopted the unit for electric-power requirements such as rig lighting, auxiliary motors, and full power load. Also may be used at pipe-line pumping stations, refineries, and gasoline plants. *Carson Machine & Supply Co.*

IT'S NEW CHECK IT

(4) NEW SLIDE RULE is useful to piping engineers and others concerned with the satisfactory performance of piping systems. Called the velocity and pressure-drop calculator, it gives two kinds of answers to fluid-flow problems: (1)a quick estimate based upon a pipe friction

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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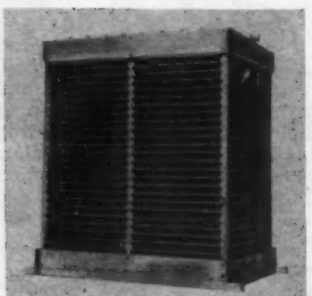
factor of 0.006, and (2) an accurate solution, derived from the estimate by applying a correction factor to the straight-pipe losses. The fitting and valve losses are independent of the friction factor and therefore require no correction. One part of the rule is devoted to liquids and another to gaseous fluids. Friction factor correction chart and the slide giving fitting and valve losses are common to both type of fluids. *Tube Turns, Inc.*

IT'S NEW CHECK IT

(5) ELECTRIC CLEANING MACHINE removes rust, scale, slush, and sediment from industrial pipe lines. Machine can be moved and operated by one man. It is driven by

¼ hp. motor and will clean process lines 2 to 8 in. in diameter. Unit is complete with a variety of sizes of cutting blades and lengths of flexible steel cable. Machine can be assembled or disassembled without a wrench. *Spartan Tool Co.*

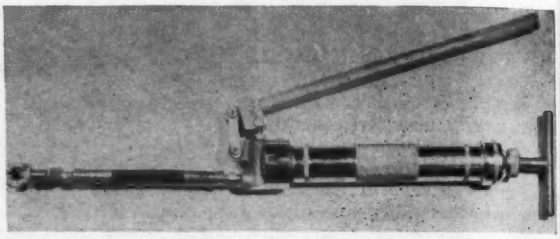
IT'S NEW CHECK IT



(6) NATURAL - DRAFT COOLING TOWER embodies the engineering design, balanced spray system, and predetermined performance only previously available in large towers. Lumber is fabricated from heavy California heart redwood—all hardware galvanized. Machined louver posts are without troublesome nails, bolts, or backup strips. Louvers are slip-fit and are readily removable for inspection or access to the interior of the tower. Spray system is designed to give maximum breakup at lowest pressure and to give a balanced spray in all areas in the tower. Bronze spray nozzles are selected to give maximum efficiency at the specified gallonage. Basin is complete with wooden walls and heavy steel basin complete with automatic float valve and noncavitating cast-iron suction. *Marley Company, Inc.*

IT'S NEW CHECK IT

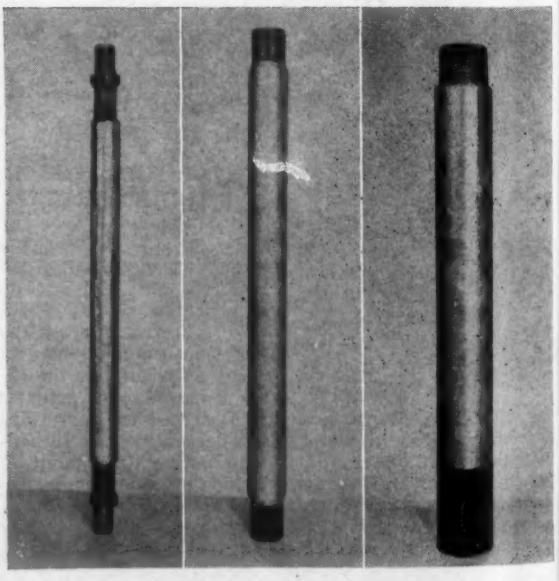
(7) PLUG-VALVE LUBRICATION UNIT provides easier, faster, and more positive valve lubrication. Only 1 minute is needed with the new gun. Lubricants are packed in barrel-size sticks for quick refilling. To



adapt a valve for the gun, the lubricant screw is removed and replaced with proper fitting and gun adapter. *Delta Engineering Sales Co.*

IT'S NEW CHECK IT

(8) NEW ELECTROLYSIS ARRESTORS eliminate or substantially reduce repairs and down time resulting from corrosion or electrolysis of oil-well pumping equipment. Electrical currents are attracted and neutralized by the arrestors. A casting of high-purity, expendable, negative

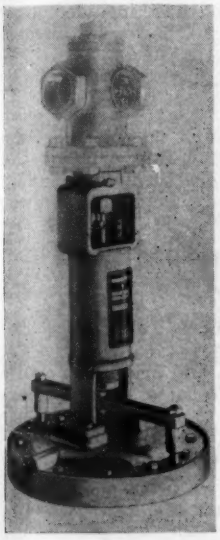


metals incasing a 2-ft. pin and pin A.P.I. pony rod, these arrestors are placed in the rod string, the number and location depending upon the severity of the corrosion. Where severe corrosion occurs at the bottom of the pump the gas anchor arrestor is employed. To combat tubing corrosion the tubing arrestor is installed. *Don H. Swindler.*

IT'S NEW CHECK IT

(9) THERM-O-CAN, a hot or cold container for foods and liquids, meets the demand for a rugged container for use by men working in out-of-the-way places. Can has a large opening and is easy to carry. It has a braced bottom and spun-glass insulation. Bale locking lid provides tight closure. Comes in 1½, 3, and 5-gal. sizes in all-aluminum construction. *H. D. Shawver Co., Inc.*

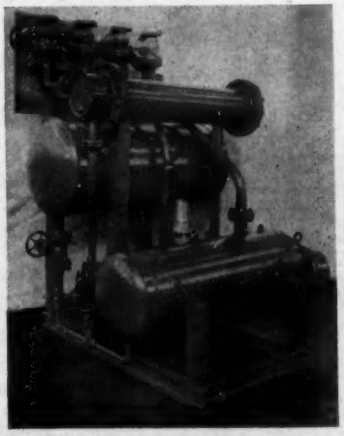
IT'S NEW CHECK IT



(10) NEW REVERSING SUPERSTRUCTURE for use on diaphragm-regulating valves, permits reversing of valve action by simple substitution for the standard superstructure. There is no need to remove the valve body from the line. This can save many man hours ordinarily required to remove a diaphragm-regulating valve from the pipe line, remove the old gaskets, scrape the faces of the flanges, and invert the valve body. Same characteristic valve action is maintained when changing from one superstructure to another, including minimum hysteresis, the same effective diaphragm area, and spring characteristic as the standard. *Leslie Co.*

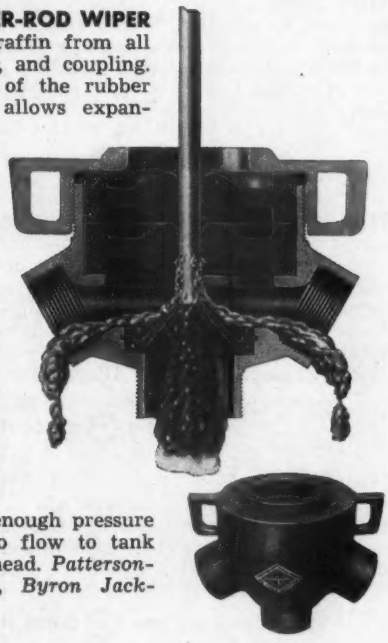
IT'S NEW CHECK IT

(11) HIGH-TEMPERATURE - HEATING AND COOLING UNIT provides a self-contained Dowtherm heating and cooling system for pilot operation or small plant. System has a heating capacity of 30 kw., or 100,000 B.t.u. per hour. Installation requires connection of only four valves to equipment, and the attachment of electricity and water lines. Controlled heating and cooling is provided from room temperature to 700° F. Unit is shipped assembled ready for operation. *Blaw-Knox Division, Blaw Knox Co.*



IT'S NEW CHECK IT

(12) NEW SUCKER-ROD WIPER strips oil and paraffin from all size rods, squares, and coupling. Improved design of the rubber wiping elements allows expansions from ½ to 2⅜ in. Rods may be pulled as fast as necessary with no oil flipping out on the crew. Small conical-rubber wiping element below two main wiping elements acts as one-way valve. It prevents paraffin that has been stripped from falling back in the hole. Main wiping elements will take enough pressure to allow crude to flow to tank if well makes a head. *Patterson-Ballagh Division, Byron Jackson Co.*



IT'S NEW CHECK IT

(13) NEW TRAIL-LUBER is a mobile lubrication depot for oil-field machinery. Complete, compact, and self-powered, the new lubrication unit services heavy equipment right "on location." Included on the unit are: a two-

compartment hopper for pressure lube and gear lube; two air-operated pumps; two 20-ft. lubricant hoses with suitable adapters; one 25-ft. air hose with air-line coupler, tire chuck, and blower valve; a Briggs & Stratton "A" heavy-duty engine, rated 1¾ hp.; and an air compressor with a 15-gal. storage tank, which delivers 7 cu. ft. per minute. *Gray Inc., Industrial Division.*

IT'S NEW CHECK IT

TRADE LITERATURE

(14) MACK IN THE OIL FIELDS. Eight pages in new booklet are packed with action pictures of trucks at work on oil-field-hauling jobs of every description. Covering trucks and tractors, four and six-wheel vehicles, powered by gasoline, diesel, and butanefueled engines, booklet describes and illustrates practically every type of truck and tractor design used in the specialized hauling of oil-field material and equipment. *Mack Trucks, Inc.*

IT'S NEW ✓ CHECK IT

(15) ALLOY AND WELDABILITY DIRECTORY. Condensation of a United States and Canadian engineering survey designed to show weldability of several thousand major and minor commercial alloys, as revealed by type of weld, equipment design, and practical application of special gas and arc welding rods, has been accomplished in an eight-page three-color technical directory. *Eutectic Welding Alloys Corp.*

IT'S NEW ✓ CHECK IT

(16) VALVES. New 12-page catalog covers slide valves, butterfly valves, and automatic and power-operated control valves. Various types of each of these valves are described and illustrated. Dimensions and engineering diagrams included. *W. S. Rockwell Co.*

IT'S NEW ✓ CHECK IT

(17) TRUCK AND HAND-CAR LOADING ASSEMBLIES. New 32-page catalog describes flexible dome-type loading assemblies. Nine types of loading assemblies are illustrated. Swing joints, ball joints, and other accessories also are shown. *Oil Equipment Manufacturing Co.*

IT'S NEW ✓ CHECK IT

(18) CENTRIFUGAL PUMPS. A 36-page 2-color booklet describes a simply designed pump for corrosive service. Included in this complete material are data on impellers, priming, and several types of centrifugal pumps. Cross-section drawing, dimensions, and capacity charts included. *Nagle Brothers.*

IT'S NEW ✓ CHECK IT

(19) ASBESTOS TEXTILES. New 16-page brochure printed in 2 colors contains 26 photographs which show asbestos mining operations, carding and spinning machines and various asbestos textile products, including reproductions of 10 styles of asbestos cloth. *Johns-Manville Corp.*

IT'S NEW ✓ CHECK IT

(20) OIL AND GAS APPRAISALS. Various methods used in oil and gas appraisals are treated in 12-page pamphlet. Graphs show typical rate-time decline curve, rate-cumulative decline curve, curve showing relation of bottom-hole pressure to recovery, and a curve showing relation of per cent oil in total fluid to recovery. *Keplinger & Wanenmacher.*

IT'S NEW ✓ CHECK IT

(21) ELECTRO-NEUTRALIZERS. New pocket folder describes electro-neutralizer which prevents, destroys, and stops scale without the use of chemicals in boilers, condensers, evaporators, hot-water systems, and diesel installations. Illustrated. *Oklahoma Neutralizer Co.*

IT'S NEW ✓ CHECK IT

(22) ANGLE AND OFFSET VALVES. A four-page folder describes and illustrates line of forged-brass angle and offset valves. Construction features are shown in cutaway views of valves. Engineering data included. *Wallace Tube Co.*

IT'S NEW ✓ CHECK IT

(23) ACTUATING CYLINDERS. New 4-page bulletin suggests 20 individual uses of actuating cylinders for oil, water, or air operation. Time saving applications for petroleum and other industries are covered. *Engineering Products Co.*

IT'S NEW ✓ CHECK IT

(24) ROLLER-CHAIN FLEXIBLE COUPLINGS. New catalog presents a comprehensive story of couplings . . . their design, application, selection, and prices. To clarify intricate design and application features, cutaway, "explosion" photos and simple drawings are used. Diagrams of the five types of shaft misalignment are shown. *Baldwin-Duckworth, Division of Chain Belt Co.*

IT'S NEW ✓ CHECK IT

(25) BUTANE-PROPANE SKID TANKS. New four-page catalog insert describes and illustrates butane-propane skid tanks for drilling rigs, pump units, etc. Fittings are illustrated in descriptive drawing. Capacities, specifications, and prices included. *Black, Sivalls & Bryson, Inc.*

IT'S NEW ✓ CHECK IT

(26) LASTING PROTECTION FOR METAL SURFACES. New eight-page bulletin describes an elastic coating which is spray applied to metal surfaces. Material emphasizes that there is no measurable moisture vapor transmission through the film. Coating stays pliable and "heals" itself where broken or scratched. *Arco Co.*

IT'S NEW ✓ CHECK IT

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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FOR GENERAL SERVICE, the Mission Silver Top Valve with the replaceable wear-taking bushing is unquestionably the most economical valve on the market to operate.

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1. Mission's method of sealing between the valve seat and the valve body has been proved through the years to be superior.

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3. The Mission Super-Service Valve does not have the interchangeable wear-taking bushing that is such a popular feature of the Mission Silver Top Valve. Instead it has four cross arms which function both as a striking surface and for distributing the load. It has a longer valve stem to reduce valve "wobble".

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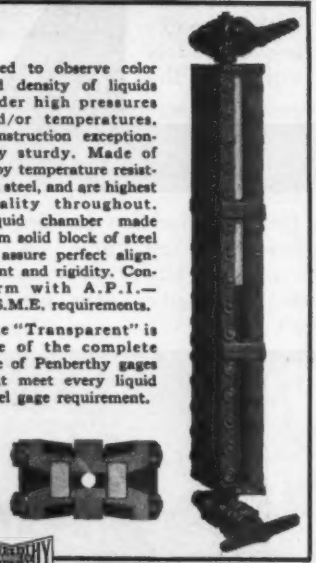
The "Transparent" is one of the complete line of Penberthy gages that meet every liquid level gage requirement.



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REFINING

Bright Stock, Paraffin, And Blends Show Gain

Production of bright stock, paraffin oils, and blended oils showed increases during February over the previous month, according to the Western Refiners Association in its report on operations of 13 midwestern refiners.

Bright stock output increased from 9,529 bbl. daily in January to 9,652 bbl. daily in February; paraffin oils increased from 3,245 bbl. daily to 4,231 bbl.; and blended oils were up from 15,878 bbl. to 18,014 bbl. daily.

Viscous neutrals dropped from 17,359 bbl. daily in January to 17,158 bbl. daily in February; and steam refined stock was down from 754 to 730 bbl. daily.

Everett Refinery Run Of 114 Days Reported

Completion of a record run of 114 days without a shutdown at the Everett, Mass., refinery of Esso Standard Oil Co., has been announced by C. H. Cole, manager.

Formerly the plant operated on 49-day runs. The long run, Cole said, was made to help relieve the serious winter fuels shortage in New England.

A better cushion against excessive winter demands is being provided at the refinery by the construction of additional storage tankage for 10,000,000 gal. of kerosine and heating oils, Cole said.

1,000 Oil Chemists to Attend A.C.S. Meeting

More than 1,000 petroleum chemists are expected to attend the 113th annual meeting of the American Chemical Society in Chicago April 19-23, according to Dr. Gustav Egloff, Universal Oil Products Co., chairman of the petroleum division of that society. Some 60 reports of advances and developments in petroleum chemistry and technology will be presented during the 4-day meeting.

The subject of modern motor fuels will bring out eight papers by leaders in that field, including discussions by technologists from Socony-Vacuum Oil Co., Inc., on diesel fuels, and one on the chemistry of gum formation from the work of Shell Development Co. chemists.

A high polymer forum will be held in collaboration with cellulose, colloid, organic, paint, varnish and plastics, physical and inorganic, and rubber divisions. Colloid chemistry advances, the origin of petroleum and the composition of Colorado shale-oil naphthas are some of the other papers to be given. Other authors include Dr. John Griswold, University of Texas; Dr. E. C. Hughes, Standard Oil Co. of Ohio; Dr. G. G. Lamb, Northwestern University; and H. C. Rampton, of Anglo-Iranian Oil Co., Ltd.'s research department at Sunbury-on-Thames, England.

Texas City Plant to Be In Operation by June

Monsanto Chemical Co.'s Texas City, Tex., plant, which was destroyed last April when a ship exploded in the harbor, is expected to be in operation by June.

The ethylene unit is to be in operation this month.

Edmonton Refinery to Be In Operation by July 1

SARNIA, Ont.—Imperial Oil, Ltd.'s new refinery now under construction at Edmonton, Alta., is scheduled to be in operation by July 1, Dwight Simmons, assistant chief engineer of the Imperial refinery here, said this week.

By October 1 the new refinery is expected to be handling about 6,000 daily, Simmons said.

Wider Representation for Refining Meeting Planned

NEW YORK.—The 1948 Mid-Year Meeting of the Refining Division of the American Petroleum Institute is being designed to offer benefits and interest to refinery personnel in supervisory positions as well as to its technical men, according to Dr. R. E. Wilson, vice president for refining of the Institute. The meeting will be held at the Benjamin Franklin Hotel, Philadelphia, May 10-13.

Refining executives are being urged to release a representative number of their plant men to attend these meetings, where the programs are designed to be practical approaches to the technical problems, Dr. Wilson said.

Among the more important subjects to be discussed is the training

of refinery personnel, part of the Institute's national program for education of men in the oil industry.

Higher octane number motor fuels and the problems of production of butane and other liquefied gases are other subjects. Corrosion problems, accentuated by the introduction of new crudes high in sulfur and corrosive constituents, will be discussed, and methods to combat corrosion will be presented.

Ohio Oil Co.'s Plant Sets Safety Record

Operation of Ohio Oil Co.'s 6,500-bbl. refinery at Lovell, Wyo., since November 25, 1938, without a lost-time accident is the safety record established by that plant, according to J. C. Askam, chief safety engineer for Ohio.

More than 600,000 manhours have been worked since the last lost-time accident at this refinery. B. B. Miller is general superintendent.

Texaco Establishes Fellowship at U.S.C.

The Texas Co. is establishing a graduate fellowship at the University of Southern California to encourage advanced studies and research in the field of chemical engineering.

Purpose of the awards will be to study fundamental problems of distillation in refinery procedure, company officials said. The dean of the college of engineering will make the awards.

Shell Refinery Men Discuss Problems

Refinery engineering problems were discussed during a 3-day meeting last week at the Roosevelt Hotel in New Orleans by engineers and officials from Shell Oil Co., Inc.,'s refineries throughout the country and from the head office of the manufacturing department in New York.

Approximately 70 attended the annual company meeting of refinery engineering representatives. W. F. Court, manager of engineering in the manufacturing department, was leader for the sessions. Particular attention was given to increased efficiency in maintenance and construction engineering. "With material and labor costs at an all-time high, the task of the engineer to find optimum values in design, efficiency of operation, and cost of maintenance is greater than ever before," said Court.

German Impregnants Described in Report

A synthetic hydrocarbon known as "Z-wax" has been developed by I.G. Farbenindustrie for use as a paper capacitor impregnant and other purposes. Details of its manufacture and the manufacture of five other types of impregnants at 17 major German firms is described fully in a 165-page report (PB-75859) now available from the Office of Technical Services.

The raw material which is produced from Montan wax at the Oppau plant of I.G. Farben, initially contains some 17 per cent resin which is eliminated by treatment with a cold benzene alcohol mixture. Z-wax, which resembles natural paraffin wax, has a chain length of 55-60 carbon atoms with a melting point of about 100° C. and a low dielectric constant of about 2.1, the report said.

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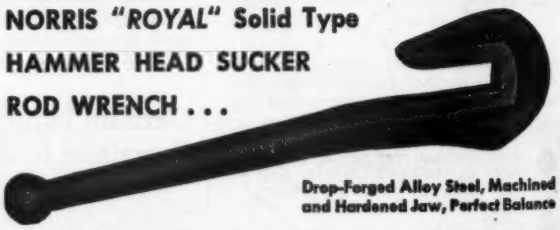

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PIPE LINES

Oklahoma Natural Plans 148 Miles of New Lines

Oklahoma Natural Gas Co. has authorized the construction of approximately 148 miles of coated and wrapped pipe lines. Included are the following projects in Oklahoma: 72 miles of 16-in. from a point in Township 8n, Range 9e, to a point in Township 4n, Range 2w; 31 miles of 12¾-in. from a point in Township 4n, Range 2w, to a point in Township 1s, Range 5w, 36 miles of 12¾ from a point in Township 4s, Range 2w, to a point in Township 5n, Range 8w; 7½ miles of 18-in. and 1½ miles of 16-in. from a point in Township 15n, Range 15e, to a point in Township 15n, Range 14e.

Removal and reconditioning will be done on approximately 35 miles of 16-in. from a point in Township 13n, Range 16e, to a point in Township 7n, Range 18e. Pipe will be removed amounting to 34 miles of 12¾-in. from a point in Township 8n, Range 9e, to a point in Township 4n, Range 9e.

Rocky Mountain Awards Contracts for 148 Miles

Rocky Mountain Pipe Line Co., an affiliate of Continental Oil Co., has contracted the laying of 148 miles of crude-oil lines for which construction had been scheduled to start after April 1.

Osage Contracting Co. has contracted the laying of 100 miles of 10¾-in. to be completed July 1 between Section 12, Township 3s, Range 68w, Adams County, Colorado, in the vicinity of Denver, to a point 17 miles north of Cheyenne, in Laramie County, Wyoming.

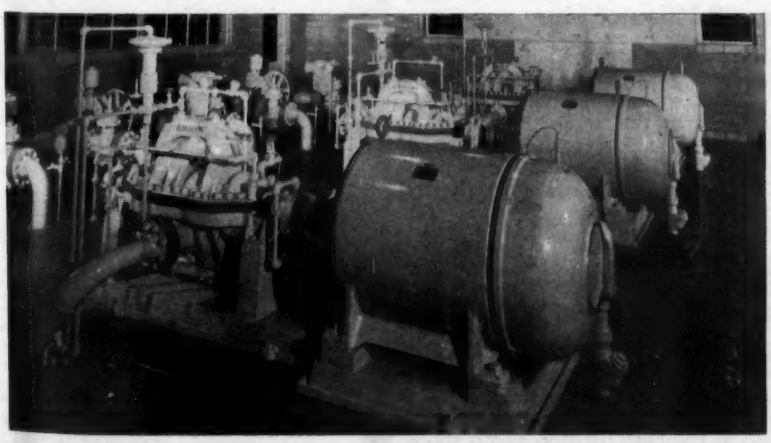
Goldenstern & Stolpher are undertaking the laying of 18 miles of 10¾-in. for the Rocky Mountain company from a point north of Cheyenne to Section 4, Township 7n, Range 66w, Laramie County, Wyoming, to be completed May 1. This contractor will also lay 30 miles of 8⅝-in. for June 15 completion, from a point 11 miles south of Chugwater, Wyo., to a point 19 miles north of Chugwater in Section 19, Township 25n, Range 65w, Platte County, Wyoming.

FPC Examiner Approves Panhandle 356-Mile Line

A Federal Power Commission examiner has approved the request of Panhandle Eastern Pipeline Co. for authority to construct 356 miles of 26-in. lines, compressor stations, and other facilities to cost an estimated $27,021,000.

If no objections are filed within a month, the examiner's decision will become automatically the FPC decision.

The lines, scheduled for completion in 1950, would give Panhandle two interconnected looped lines from its Liberal, Kans., station to Detroit and would increase the system's capacity



Pumping equipment on Humble Pipe Line Co.'s products pipe line from Baytown to the Dallas-Fort Worth area uses the series operation of motor-driven centrifugal units. This view of the pump room shows the control room in the right background. Metering facilities are beyond the pump room wall on the left

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Panhandle transports natural gas from Texas, Oklahoma, and Kansas, to markets in Indiana, Illinois, Ohio, and Michigan.

Glenn Pool Station Has Pumped 500,000,000 Bbl.

Early this week crude oil pumped through Interstate Oil Pipe Line Co.'s Glenn Pool, Okla., station passed the 500,000,000-bbl. mark in the history of operations of this gateway facility, which was under construction in 1912. Initial capacity of the Glenn Pool station was 20,000 bbl. daily. Capacity subsequently was increased to 120,000 bbl., according to The Liner, company publication. Line capacity into the station is 140,000 bbl. daily. The record day was August 8, 1945, when a gross of 95,175 bbl. was pumped. Present throughput is at the rate of 80,000 bbl. daily, which is limited by the capacity of Ajax Pipe Line Corp. facilities for transportation northeastward.

Originally the station had three 100-hp. units. Now it has three 300-hp. and two 600-hp. units, totaling 2,100 installed horsepower.

Pan American Begins Chocolate Bayou Line

Pan American Gas Co. has begun construction on its 20-mile, 16-in. gas pipe line from Chocolate Bayou field of Brazoria County, Texas, to Texas City.

The new line, which will parallel the company's present line, will have a capacity of about 150,000,000 cu. ft. daily.

Union Oil Co. Plans to Lay 30 Miles of Line

Union Oil Co. of California has authorized construction of 30 miles of pipe lines which had not been contracted early this week. These will consist of 10 miles of 6-in. products line between Torrance and Rosecrans and miscellaneous renewals of 8-in. and 10-in. lines.

Contracts for Pump House, Lines Awarded

HOUSTON.—Texas Pipe Line Co. has awarded a contract to R. P. Farnsworth & Co., Inc., Houston, for the erection of a brick and steel pump house at the East Houston pump station. The contract also includes the installation of equipment, piping, and auxiliaries.

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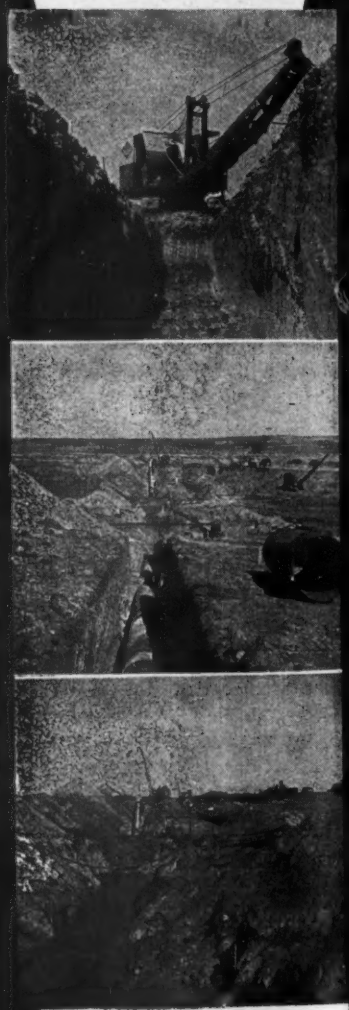

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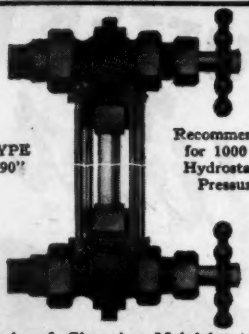

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the East Houston station was awarded to Latex Construction Co., Houston, which will lay 20-in. suction lines and a 20-in. manifold. Both the Latex and the Farnsworth jobs will be started soon.

FPC to Hold Open Record In Trans-Continental Case

The Federal Power Commission will hold open for 6 months proceedings on the request of Trans-Continental Gas Pipe Line Co. for authority to construct a natural-gas transmission line from Texas gas fields to the eastern seaboard.

The commission in its recent hearings found that Trans-Continental did not prove adequate and firmly committed natural-gas supply sufficient to provide the full requirements of the project for 15 years.

It ordered that the record remain open to enable Trans-Continental to present further evidence that it has firm contracts for the period. It also directed the company to present a plan for using storage fields to "best serve the broader public interest."

A further hearing on the proposal, FPC said, will be held when the company "indicates its ability and desire to go forward" with the presentation of additional evidence.

The order denied the motion of Texas Eastern Transmission Corp. to dismiss the Trans-Continental application.

Construction Begun On Pump-Station Housing

Humble Pipe Line has begun construction on a $150,000 housing project for personnel employed at its Satsuma pump station, about 18 miles from Houston.

The company also has under way now a modernization program at the pump station which will boost the capacity of the station. It now is handling about 200,000 bbl. daily.

Coatesville-Port Jervis Line Due for Completion

Completion is scheduled by April 15 on the 118-mile 14-in. line of Manufacturers Light & Heat Co. between Coatesville, Pa., and Port Jervis, N. Y. Contractor is Williams Brothers Corp.

Also scheduled for completion on the same day is a 4.7-mile 14-in. line being built by Home Gas Co., also an affiliate of Columbia Gas & Electric Corp., between Port Jervis and Deer Park, N. Y. This line also is being built by Williams Brothers.

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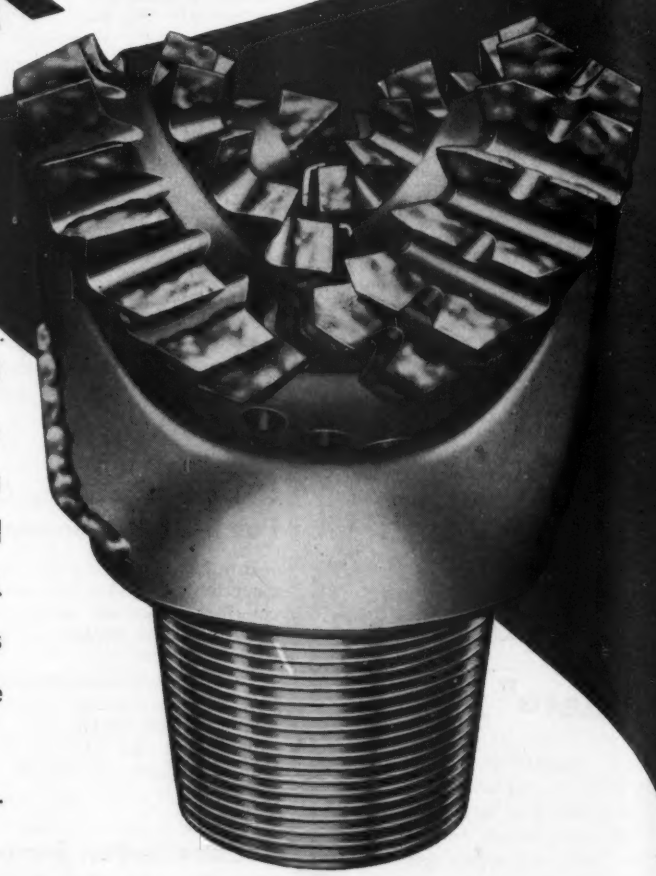

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Associated with Stearns are 19 others from Russell; Denver; Holyoke, Colo.; Lakewood, Colo.; and Gordon, Neb. Company is outgrowth of the business organized by Stearn's father, Bo Stearns, who died several years ago.

Two Delta Rigs to Rockies

Delta Drilling Co., Tyler, Tex., has moved two rigs to the Rocky Mountain district. One, an Emsco J-1250, four-motored unit, will drill at Church Butte, Wyo., for Mountain Fuel Supply Co. This test will go to 13,500 ft. and will require some diamond coring. The second rig, an Emsco J-1250, three-motored unit, will drill for Atlantic Refining Co. at Riverton, Wyo.

Santa Fe Drilling Co., Santa Fe Springs, has contracted for two wells recently—Union Oil Co. 105 Bell, Santa Fe Springs, and Bell-Casmite Oil Co. 8 Morganti, Casmalia field, California.

Hollandsworth Drilling Co., Longview, has started 5,000-ft. test in Hawkins field, Wood County, East Texas, its 1 Nannie Shamburger, Hannah Payne Survey.

Mealy-Wolf Drilling Co., Tulsa, has contract for Frank Billingslea 13 Wayman, SE NW NW 22-15n-8e, to test Wilcox sand in Southeast Depew field, Creek County, Oklahoma.

Rocky Mountain Drilling Co., Los Angeles, has operations under way at Standard Oil Co. of California 62-4 McGrath, Montalvo area, Ventura County, California.

Bell & Burden, Compton, Calif., are drilling Continental Oil Co. 57 Grubb, San Miguelito field, Ventura County, California.

Big Chief Drilling Co., Oklahoma City, et al have drilling under way on the Escambia County, Alabama, wildcat, the 1 McMillan, in SW SW 18-3n-10e, 5 miles southeast of Appleton.

J. I. Roberts, Shreveport, will drill Arkansas Fuel Oil Co. 1 Bowman-Hicks Lumber Co., C SW SW 3-7n-12w, 6,700-ft. wildcat 4 miles southeast of Zwolle, Sabine Parish, North Louisiana.

B & M Drilling Co. has Woodbine contract for drilling of R. J. Caraway 1 Sessions, wildcat in J. M. Musquez Grant, 10 miles east of Rusk, Sulphur Creek area, Cherokee County, East Texas.

W. H. Black Drilling Co., Midland, is taking over A. N. Etz 1 Shildneck, wildcat in 24-16s-20e, about 12 miles northwest of Hope, Chaves County, New Mexico, to deepen it from 1,763 ft. in lime to 6,000-ft. test in Ellenburger

Ward & McCullough Drilling Co., Wichita Falls, is starting on its 1 L. P. Wilson, north half of Block 66, ATNCL Survey, ½ mile north of North Chalk Hill field, Archer County, North Texas. Contract is for 5,000 ft.

Sam Tennant Drilling Co., Blackwell, Okla., has just finished a four-well contract for Mid-Continent Petroleum Corp. in SW 18-28n-1e, Kay County, Oklahoma, and is moving tools to NE SE NE 24-28n-1w, to drill Wilcox sand test for own account and H. W. Snowden.

Meredith, Clegg & Hunt, Houston, have set surface pipe and are drilling at 5,445 ft. on the Coast Co. 1 Glasscock in Colorado County, Texas. Contract depth is 9,500 ft.

Harvey Brothers Drilling Co. has work under way at Frank Wood et al 1 C. T. Maddox, 6,000-ft. rotary test in Block 17, Angelina County School Land Survey, about 11 miles northeast of Henrietta in Clay County, North Texas.

Drilling Contractors, Ltd., of Calgary have started St. Ann 1, LSD 9, 28-55-4w5, a joint test for Anglo-Canadian Oils, Home Oil Co., and Calgary & Edmonton Corp. on Alexis Reserve, northwest of Edmonton.

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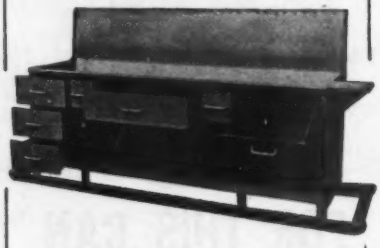

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Growth.—Firm was formed in 1938 by Thomas P. Pike, with H. G. Haney as vice president and general drilling superintendent. Stanwood I. Williams joined as a vice president in 1944, and Clyde B. Simpson became a vice president in 1947.

Pike has continued to expand steadily since its organization and currently is operating 11 rotary rigs. All operations are confined to the state of California, with main office in Los Angeles, branch office in Bakersfield, and branch office and equipment yard at Long Beach. Company has one producing lease in Midway-Sunset field of Kern County, making approximately 5,000 bbl. monthly.

Rigs.—Ten rotary rigs with capacities ranging from 4,500 to 12,500 ft. Two are heavy steam rigs, four are heavy-duty gas-engine-powered rigs, one is a heavy-duty diesel-powered rig, two are light power rigs (one a diesel and the other gas-engine operated), and the remaining rig is a trailer-mounted rambler rig of 6,000-ft. capacity. In addition to the 10 company-owned rigs a rented rig of the heavy-duty steam type is being operated.

Personnel.—T. P. Pike, president; H. G. Haney, vice president and general drilling superintendent; S. I. Williams, vice president; C. B. Simpson, vice president; Charles Riemann, secretary-traseurer; Harold Jordan, in charge of Long Beach office, and Francis Kee, in charge of Bakersfield office.

Sidelights. — Pike has developed a reputation as one of the outstanding directional-drilling firms in the country, and is currently directionally drilling two wells in Inglewood field, Los Angeles County. Three other whipstock jobs are under way at the present time, making a total of 5 directionally drilling wells out of the 11 rigs running.

Firm recently completed Edward Pauley 1 Pacific Tube - Stewart in East Los Angeles field at total depth of 8,430 ft. Well was an outstanding accomplishment in that water shutoff was obtained in first attempt, whereas formerly as long as 3 to 4 weeks had been required.

Western Drilling Co., Longview, moved in rotary equipment after American Republics Corp. spudded and set surface casing at its 1 Clay D. and C. L. Atkins, 4½ miles west of Christoval, Tom Green County, West Texas. The proposed Ellenburger test will go to 6,700 ft. Location is 660 ft. from north and east lines of the R. Smith Survey, A-1,384.

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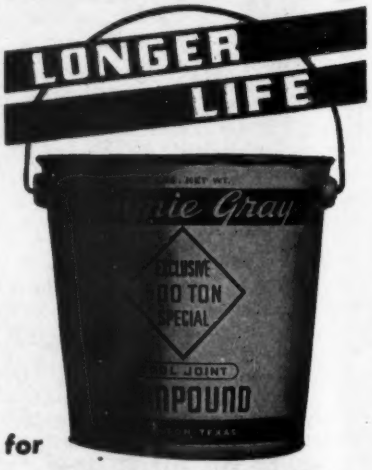

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NATURAL GAS

Work to Begin Soon on Canadian Oil-Gas Plant

PORT STANLEY, Ont.—Structural work will be started immediately on a $2,000,000 oil-gas plant for Dominion Natural Gas Co. here.

General contract for the buildings has been awarded Johnson Brothers Co., of Brantford. Contract for erecting the gas holders and oil and water storage tanks has been let to Horton Steel Works, Fort Erie.

The plant is scheduled to be in operation by October and will supplement declining natural-gas supplies in the area next winter.

United Gas Payments to Producers Show Gain

The amount of money paid to gas producers by United Gas Corp. in 1947 showed an increase of more than $2,000,000 over the total paid in 1946, according to the company's annual report. The total paid to producers reached an all-time record reflecting the increased volume of gas sales by the company. In a story on United Gas' report *(The Oil and Gas Journal, March 25, page 223)* it was inadvertently stated $2,000,000 was the total paid to producers, whereas actually this sum represents the amount of the increase in payments.

Electric Utilities' Gas Use for February Drops

Electric utility power plants consumed 28,193,633,000 cu. ft. of gas during February. This is 36.1 per cent more than the consumption for the same period a year ago. Consumption for February this year was 2.6 per cent below that of the previous month.

Panhandle Eastern's Gas Supply to be Studied

In a hearing to begin this week the Federal Power Commission will seek to obtain information concerning the volume of gas available from Panhandle Eastern Pipe Line Co.'s system to meet customers' requirements, particularly for underground storage in Michigan, Illinois, Kentucky, Ohio, and possibly in Canada.

The investigation was initiated by FPC upon consideration of information which indicated that Panhandle's system may be unable to supply requirements of its direct customers and those of distributing utilities depending upon Panhandle for its supply in whole or in part.

The hearing also will deal with questions raised as to the legality of certain deliveries by Panhandle and "takes" by Michigan Consolidated Gas Co. for industrial use at Detroit, and in regard to other demands which are or may be made upon Panhandle for gas supplies under rate schedules on file with FPC.

FPC Suspends Rate Schedule of United Gas

A proposed rate schedule filed by United Gas Pipe Line Co. as a supplement to existing rate schedules covering sales of natural gas to Mississippi River Fuel Corp. has been suspended, pending hearing, by the Federal Power Commission.

The rate supplement sets forth rates which if applied to estimated sales to Mississippi River Fuel during the 12-month period ending April 30, 1949, would result in an annual increase of approximately $430,000, or about 27 per cent more than the annual charges under the presently effective rate schedules for natural gas sales by United to Mississippi River Fuel for resale. According to FPC, these rates and charges "appear to be greater than those demanded by United from other companies for the sale and delivery of natural gas in the same territory" and the terms of the proposed supplement "may be unlawful and contrary to provisions of the Natural Gas Act."

United transports gas in Texas, Mississippi, Louisiana, Alabama, and Florida. Mississippi River Fuel sells gas to seven distributing companies, the largest purchaser being Laclede Gas Light Co., St. Louis.

Kansas-Nebraska Expansion Set for April 15 Hearing

A hearing has been set for April 15 by the Federal Power Commission to consider an application from Kansas-Nebraska Natural Gas Co., Inc., for authorization to construct additions to its natural gas system.

Proposed facilities include partial looping of the company's Scott City-Stockton-Philipsburg and Otis-Plainville lines in Kansas, the replacement of an existing line between Holdrege and Elm Creek, Neb., with larger diameter pipe, and construction of 35 miles of new line north of Elm Creek. A 1,000 hp. compressor unit at the company's Deerfield, Kans., station would also be included. Cost of the proposed facilities has been estimated at $3,130,865.

Nine additional towns in Kansas and 12 in Nebraska which have no gas service at present would be served by the proposed new facilities.

Arkansas Natural to Sell Interest in Gas System

Arkansas Natural Gas Corp. will dispose of its interest in the natural-gas distribution system of Arkansas-Louisiana Gas Co., as ordered by the Securities and Exchange Commission under the Public Utility Holding Company Act, Henry C. Walker, president, announced last week.

Walker said the company will retain its interest in the "much more important oil, wholesale natural gas, and pipe-line properties."

Natural Gasoline

Natural-Gasoline Output Shows Drop in January

The daily average production of natural gasoline and allied products decreased in January for the first time since May 1947, according to the Bureau of Mines. Texas, California, Kansas, Wyoming, and Montana increased their production, while all other states decreased.

Stocks at plants and terminals increased 4,956,000 gal., but decreased 3,822,000 gal. at refineries, resulting in a net increase of 1,134,000 gal. in total stocks.

Production of natural gasoline and applied products for January amounted to 16,254,000 gal., or 387,000 bbl. daily.

Socony-Vacuum Will Build L.P.G. Distribution Plant

Construction of a plant with facilities for handling 100 liquefied petroleum gas cylinders daily at Portland, Me., is expected to be under way shortly and to be completed early this summer by Socony-Vacuum Oil Co., Inc. The new plant will provide speedier service and greatly facilitate distribution problems of L.P.G. to distributors in Maine and the surrounding areas.

Empty cylinders will be received at the plant where they will be cleaned, painted, and refilled before being returned to the distributors. Previously the cylinders had to be shipped into Maine from New York and Philadelphia manufacturing plants.

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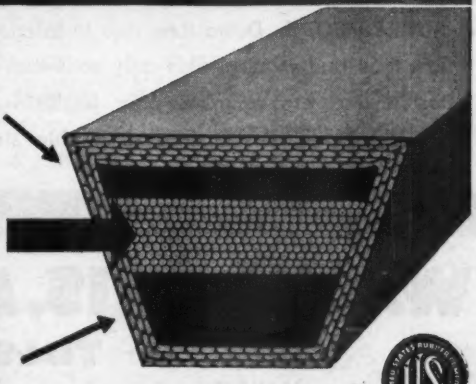

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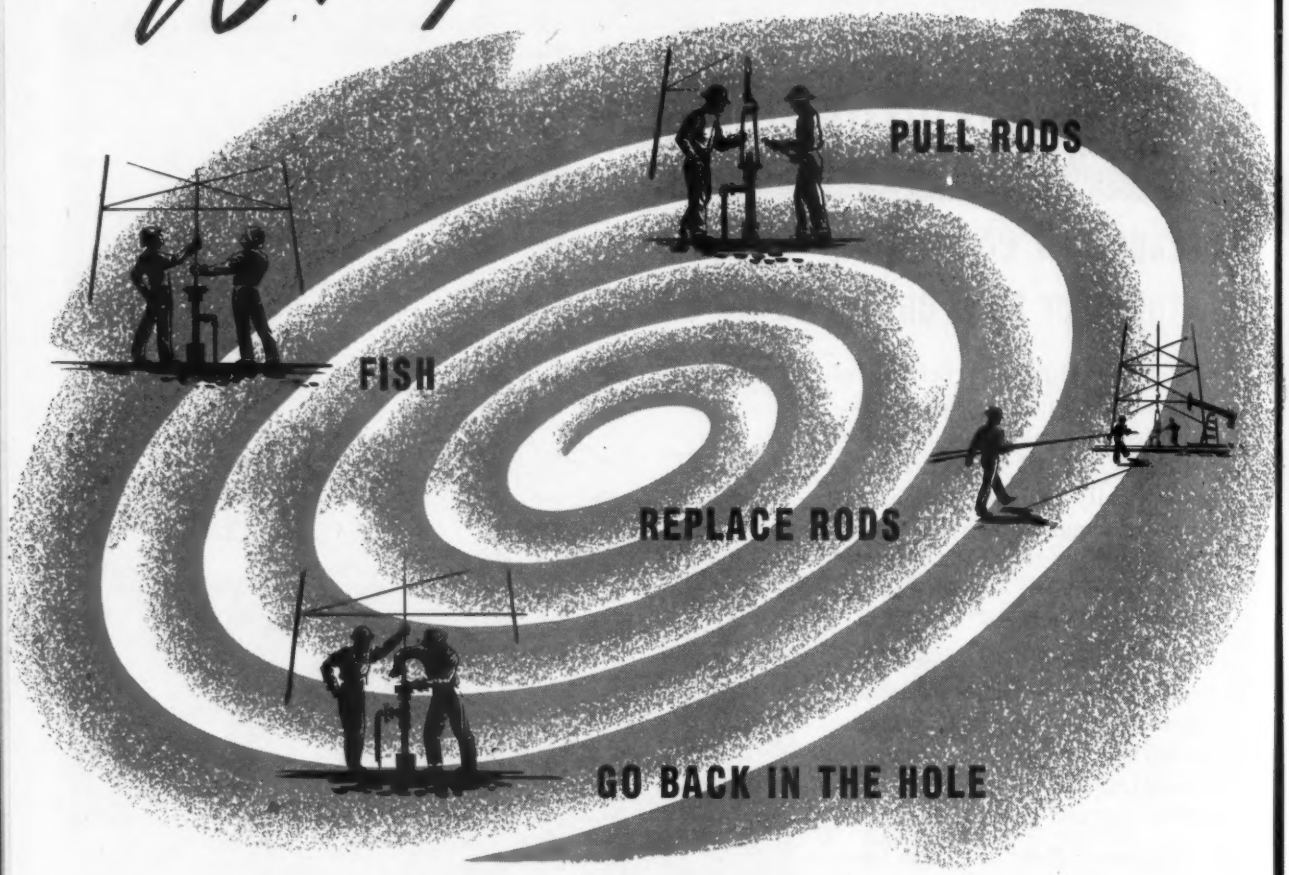

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Exploration and Drilling

New Trends in Exploration Research Thinking

ONE of the noteworthy postwar developments was the establishment of research divisions by various companies, and the inclusion in the program of a definite place for exploration research work, particularly work on new geological attacks.

More or less common to all the large-scale research work is the application of various scientific instruments, such as spectrographs, infrared spectrophotometers, X-ray diffraction apparatus, etc. The purpose of these instruments is to open new lines of attack by measuring new properties of various kinds of sediments, and trying to determine what significance may be attached to variations in these new properties. Generally this work is just getting under way on organized programs.

Importance of Background

But an unexpected trend has developed within a very short time after men were assigned to geological research full time. With time enough to think their problems through, the research specialists in some cases are deciding that the new gadgets for determining new properties are not the whole story. In fact they have decided that such work may not even be the most important part of the story.

In some noteworthy instances, the research geologist or sedimentologist seems to have concluded that the most promising line of attack lies in old records; in reexamination of the vast amount of information already accumulated. There are several projects under way that, different as they may seem on the surface, have the common basis that a research man is working on a hunch that reexamination of large masses of old data may be a fertile source of valuable information.

The specific lines of attack vary with different organizations. But they do seem to have the common denominator of assigning one thoroughly experienced sedimentologist to the task of examining a mass of old records. He may or may not have a group of full-time assistants. He may or may not go out in the field checking outcrops of sections at various places.

In all cases he has at his command the new gadgets for measuring new properties. Usually there is readily at hand, a chemical analysis section for any special work he may wish in that field. But the main weapon relied upon is one man's observation, correlated by him with his years of experience and background knowledge.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

SOUTH LOUISIANA.—The Texas Co. is drilling the first test in Louisiana to go below 3 miles in depth. Their 4 State-Barataria in Queen Bess Island area of Barataria Bay, Jefferson Parish, has been drilled to a depth of 16,068 ft., and operators continue to drill slowly in hard sandy shale and lime. No announcement has been made regarding oil and gas shows in the venture, which is located 1¼ miles northeast of the world's deepest producing well.

ROCKY MOUNTAIN.—According to latest reports, the Soap Creek oil field in southern Montana, which has been idle since 1928, will be reopened by Inland Empire Refineries, Inc. In eastern Utah, Western Natural et al are testing their Boundary Butte wildcat, after abandoning a deep test at Boulder Knoll, San Juan County; Mountain Fuel Supply is plugging back and testing at Last Chance; and California Co. is drilling in the Coconino at Upper Valley, Garfield County. Promise of a new pay and field extension is indicated in the Brinkerhoff Drilling Co. 1 Healin, Pilot Butte, Fremont County, Wyoming.

OKLAHOMA.—In Okfuskee County, Skelly Oil Co. recovered 28°-gravity oil on drill-stem test of the dense at 4,059 ft. for a possible pool opener. In Grady County, Stanolind Oil & Gas Co. 1 Briscoe, possible world's producing-depth record-holder, continues testing basal Bromide and Upper McLish at 13,673-14,192 ft.; total depth is 15,523 ft., and casing is set at 13,670 ft.

NORTH TEXAS.—On last reports, Mid-Continent Petroleum Corp.'s Wise County wildcat, 1 Kaker, northwest of Bridgeport, had good stain and odor of oil in the second conglomerate, but tested gas from 5,390-5,421 ft., and Cities Service offset to the Chico field (conglomerate) is indicating pay in the Caddo lime.

WEST TEXAS.—Confirmation well for Coke County's Arledge field, Sun Oil Co. 2 Arledge, had sulfur water in the Ellenburger and will try for completion in Marble Falls. The Marble Falls section in the same company's 1 Central National Bank of San Angelo, South Jameson field well, ran to water after making 4 bbl. of oil.

WEST COAST.—In California, the Rocket Petroleum Co. 1 Zinner Community has extended production five to six locations beyond previous limits of the Kern Bluff field, Kern County. In Washington, Union Oil Co. hopes to complete their prospective Ocean City discovery as a Commercial gas producer.

MISSISSIPPI.—Last-minute information reports that Kirby Petroleum Co. has secured drilling permits for six additional wells in the Langsdale field, Clarke County.

EAST TEXAS.—Humble Oil & Refining Co. 1 Thompson Brothers, Trinity County wildcat, flows gas and distillate on drill-stem test of the Edwards lime at 10,200-10,632 ft.

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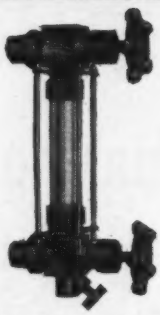

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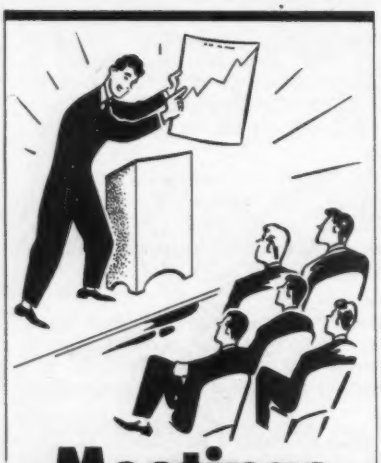

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SOUTHWEST TEXAS

Coastal Refineries Opens New Area in Starr County

CORPUS CHRISTI.—A new oil producing area approximately 2 miles north of Sam Fordyce field and 1¾ miles northwest of Sullivan City field, in southeastern Starr County, has been opened by Costal Refineries, Inc., and W. D. Kennard 1-B Louis Pena. The well is flowing oil through a 7/64-in. choke through perforations at 5,763-76 ft. Tubing pressure is 600 psi., and casing pressure 1,200 psi. Total depth is 5,844 ft. with 6-in. casing set to 5,840 ft. This well is located in Porcion 38.

A new oil pay for South Longhorn pool, Duval County, has been opened by Hiawatha Oil & Gas Co. A-3 Leroy Denman, in Santos Garcia Survey, with top of new pay at 4,233 ft. A dual completion, with perforations at 4,233-37 ft., in Lower Cole sand, flowing an initial production of 72 bbl. of oil per day through a 5/32-in. choke, and from perforations at 5,782-86 ft., initial production was 55 bbl. oil per day through a 7/64-in. choke. Total depth is 5,840 ft., and gravity of the oil is 41.2°.

Gas production from the new pay zone discovery and extension well at San Caja field in McMullen County, Edwin M. Jones Est. C-5 Ezzell, has been gaged at 1,000,000 cu. ft. of gas per day through a ¼-in. choke, with 500 psi. tubing pressure. Perforations are at 8,250-97 ft., with 2-in. tubing set on packer at 8,230 ft. This well was a deepening job in an old dry hole drilled approximately ½ mile southwest of production at San Caja, near the Live Oak County line, southwest of Simmons City.

Magnolia Petroleum Co. 1 Lester Batot, south extension gas-condensate well at La Gloria field, in Brooks County, gaged 13½ bbl. of condensate in 17 hours through a ¼-in. choke, with gas-condensate ratio of 42,000, and 1,000 psi. working pressure. When shut in, the well built up to 3,118 psi. shut-in pressure in 18 hours. Total depth is 9,500 ft., and production is through perforations at 7,660-90 ft. and 7,705-10 ft., and 2,000 gal. of acid were used. This well is in Lot 3, Block 7, Falfurrias Farm & Garden tracts.

Rock Hill Oil Co. and W. Earl Rowe 2 E. D. Wood et al, wildcat test approximately 5½ miles north-northwest of Robstown and 2 miles east of Riverside field, in northern Nueces County, developed 875 psi. working pressure in 12 minutes on a drill-stem test at 6,672-94 ft., through ¼-in. chokes, flowed gas and recovered 60 ft. of condensate-cut mud. Operators are now drilling ahead below 7,000 ft.

Coastal Refineries, Inc. and W. D. Kennard E-6 Garcia has indicated a probable new oil pay zone for the Kennard field of Starr County. On drill-stem test at 3,903-06½ ft., it recovered 450 ft. of pipe-line oil. This well is located in Porcion 93.

The 38 new locations included 14 wildcat starts, 2 each in Duval, Milam and Webb counties, and 1 each in Dimmit, Jim Hogg, Jim Wells, Nueces, Starr, Travis, Willacy and Zapata counties. Four exploratory tests were successful, 2 each in Duval and San Patriocio counties, while 13 were failures, 2 each in Bexar, Jim Hogg, Jim Wells and Webb counties, and 1 each in Duval, Milam, Starr, Travis and Zapata counties.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCATS

Duval County: New gas-condensate discovery, Government Wells-Wilcox field—Ralph E. Fair, Inc., and Jack Woodward, Inc., 1 H. Wendt, 2 mi. N-NW of Freer, old well drilled deeper, old TD 5,526 ft., new TD 7,800 ft., top pay 7,492 ft., Wilcox, perf. 7,492-7,540 ft., IP: 16,200,000 cu. ft. gas per day on open flow, gas-condensate ratio 44,000, SIP 3,840 psi., no water.

New oil pay, South Longhorn pool—Hiawatha Oil & Gas Co. A-3 Leroy Denman, in Santos Garcia Sur., SW of Longhorn field, 4 mi. E of Realitos, dual completion, top pay 4,233 ft., new pay, TD 5,840 ft., perf. 4,233-37 ft., Lower Cole sand. IP: 72 bbl. oil per day through 5/32-in. choke, GOR 365, CP 250 psi., gravity 39.8°. Top pay 5,780 ft., TD 5,840 ft., perf. 5,782-86 ft. IP: 55 bbl. oil per day through 7/64-in. choke, GOR 1,065, TP 890 psi., casing sealed, gravity 41.2°.

San Patricio County: Extension to West Sinton pool—Arnold O. Morgan 1 W. S. Crabb, in J. J. Welder & Coleman-Fulton Pasture Co. Subd., Geo. Morris Sur., 2½ mi. W of Sinton and 1 mi. W-SW of West Sinton field, top pay 5,490 ft., TD 7,485 ft., perf. 5,498-5,502 ft. IP: 41 bbl. net oil per day through 5/32-in. choke, GOR 3,030, TP 500 psi., CP 1,800 psi., gravity 41°, 5.5 per cent water.

New oil pay West Sinton pool—A. O. Morgan Oil Co. & Arnold O. Morgan 1 W. I. Thomas, in J. J. Welder Subd., John Pollan Sur., TD 3,507 ft., perf. 1,295-1,302 ft. IP: 65 bbl. oil per day on jet, gravity 19.6°.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Bexar County: Bur-Kan Pet. Co. 1 Lee Hubbard, in Irrigated Farms Subd., William Miller Sur., 2 mi. E of Lytle, dry, TD 5,203 ft. in schist. Top Edwards lime 1,861 ft., Pettit 4,095 ft., top schist 4,960 ft.

M. B. Duke 1 Est. of Teodora G. Ruiz, in Francisco Rolen League, Labor 48, just south of town of Von Ormy, dry, TD 1,320 ft., top Taylor 1,220 ft.

Duval County: Pan American Prod. Co. 1 Dionisio Garcia, in Jose Marcello Ynojosa Gr., dry, TD 5,302 ft.

Jim Hogg County: Continental Oil Co. 1 Julian Vela Pena, in M. J. Keoughan Subd., El Peyote Gr., 3 mi. S of Thompsonville, 2 mi. NW of Patel field, dry, TD 3,343 ft.

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See Composite Catalog Page 2426

S. F. Hurlbut et al 1 J. Vela Pena, in M. W. White Subd., Share 3, El Peyote Gr., 18 mi. SW of Hebbronville, dry, TD 1,579 ft.

Jim Wells County: Bridwell Oil Co. 1 W. H. Rohrey Unit, Lot 11, Sec. 14, Haldeman Subd., 4 mi. S of Premont, dry, TD 6,340 ft.

Humble Oil & Refg. Co. 1 Otto Goldapp, in Wm. Adams Farm Lots, Los Presenos Gr., 4 mi. SE of Alice, dry, TD 6,003 ft.

Milam County: H. H. Coffield et al 1 E. H. Foster, in C. Walden Sur., 2½ mi. SE of Rockdale townsite, dry, TD 2,020 ft.

Starr County: Baldridge & King 3 Davenport-State, in G. Jiminez Sur. 280, 2 mi. E of Rincon field, dry, TD 4,500 ft.

Travis County: E. R. Marts 1 Schieffer, in A. C. Caldwell Sur., 2 mi. E of Manor, 2 mi. SW of Kimbro field, dry, TD 1,518 ft.

Webb County: Humble 1 J. O. Walker, in CCSD&RGNG Sur. 1645, 13½ mi. N-NW of Aguilares, dry, TD 7,453 ft.

Sullivan & Creslenn 1 Felix Garcia, in Sur. 720, 2 mi. N of Oilton, dry, TD 2,947 ft.

Zapata County: W. L. Goldston 2 Ramirez et al, in Sam Honey Sur. 270, 10 mi. SW of Randado, near Jim Hogg County line, dry, TD 1,077 ft.

EASTERN TEXAS

San Augustine Venture Tests for Higher Flow

DALLAS.—Testing continued at D. H. Byrd et al 1 T. W. Blount, 3½ miles west of San Augustine in the Edmond Quirk Survey, San Augustine County, in an effort to increase the small oil flow from James limestone perforations between 7,821-8,006 ft. Early in the week it made 3½ bbl. of oil and some acid water, through ½-in. choke, in 6 hours. Casing pressure ranged from 730 to 350 psi. No gage was made on tubing. A later 6-hour test produced only 2 bbl. of oil, plus 3 bbl. of acid water. Tubing pressure ranged from 200 to 100 psi.

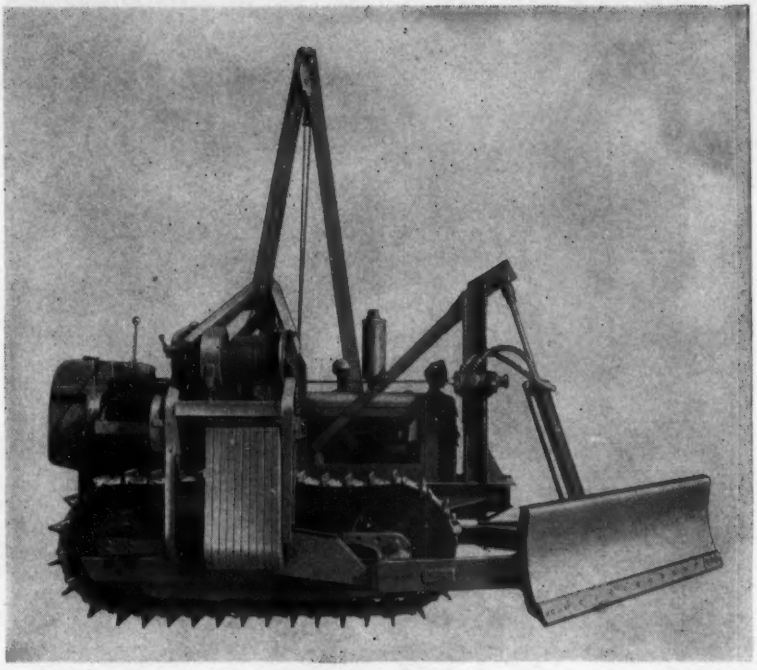
Trinity County's prospective Edwards limestone discovery at Humble Oil & Refining Co. 1 Thompson Brothers, John Chambliss Survey, 8 miles north of Trinity, stopped at total depth of 10,750 ft. to run electrical survey. Operators were indefinite about it being carried to projected depth of 11,000 ft. A drill-stem test from 10,200-10,632 ft., open 2 hours and 7 minutes, flowed gas and sprayed mud and distillate. Surface pressure was 1,500 psi. Total recovery was 1,140 ft. of mud cut with gas and 120 ft. of oil, said to be 45° gravity.

Hiawatha Oil & Gas Co. 1 Will E. Johnson, southwest outpost to the San Augustine field, was drilling below 5,712 ft. in lime and shale. It logged top of the Georgetown at 4,656 ft., on elevation of 408 ft.

In Shelby County, Humble Oil & Refining Co. 1-C Pickering Lumber Co., was making progress below 7,995 ft. in shale and lime, with no shows. W. F. Nenney 1 Ione Braziel, Smith County test, was drilling gat 6,050 ft. in shale and lime.

Garland Anthony 1 W. B. Megason was drilling below 2,623 ft. in shale. Driller's top on the Georgetown was 2,296 ft., with elevation of 477 ft. It is a new test in the William Collum Survey, ½ mile northeast of Avery in Red River County. Scheduled depth is 4,000 ft.

New exploratory work included one wildcat location each in Anderson, Angelina, Navarro and Wood counties. Thirteen field locations made up the balance of the week's total of 17 new starts. Week's completions totaled 16, being 10 oil, 2 gas and 4 dry holes. The Texas Co. completed its 1 J. B. Barnard as a new pay discovery in the Blackfoot field of Anderson County, for a daily flowing potential of 162.9 bbl. of oil



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Fills a real need — this new line of pumps is ideal for all industries faced with the problem of transferring corrosive and erosive thin liquids. Ampco Metal, Inc. manufactures these corrosion-resistant pumps, heretofore considered as special, on a production basis — giving you production-built prices and deliveries.

Ampco Metal makes the difference. The pumps are of the heavy-duty industrial type. They are soundly designed for mechanical durability, high efficiency, and ease of servicing. The paramount feature, however, is the material used in their construction; namely, *all aluminum bronze* as produced in Ampco Metal's laboratory-controlled foundry. These time-proven aluminum bronzes make possible the pumping of such liquids as sulphuric acid, acetic acid, mine water, brines, oils, solvents, beer, food process liquors, etc. Not only are the pump parts in immediate contact with the liquid made of aluminum bronze, but supporting members subject to seepage and spray, such as pedestal, shaft, and sleeve, also are made of this corrosion-resistant material.

Guaranteed efficiencies. These single stage, single suction, corrosion-resistant pumps use totally enclosed impellers. All liquid passages are streamlined for maximum efficiency, quiet operation, and minimum wear. Smooth sloping characteristics have sharp break-off to limit maximum horsepower requirements. All sizes of pumps are available either as pedestal-type for coupling connection to any type of drive, or close-coupled to a face-type motor.

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from the Rodessa at 9,035-60 ft. Oil well completions this week included two distillate wells, one each in the Whelan and Bethany fields.

EAST TEXAS (DISTRICTS 5 & 6) SUCCESSFUL WILDCAT

Grayson County: Standard Oil Co. of Texas 1 J. C. Kreager, Alexander & Richards Sur., A-42, 3 mi. N Sherman, pumped 58 bbl. 39°-gravity oil, sand 4,394-4,403 ft., TD 5,738 ft.

EAST TEXAS (DISTRICTS 5 & 6) WILDCAT FAILURE

Limestone County: Stanolind Oil & Gas Co. 1 John Bell, Ruzelia Scott Sur., 3 mi. S Coolidge, dry, TD 2,476 ft., Woodbine 2,317 ft., salt water sand 2,318 ft.

LA.-ARK.

Lincoln Parish Test Flows Gas-Distillate

SHREVEPORT.—W. C. Feazel 1 C. C. Barham, Lincoln Parish test in 21-20n-3w, 3 miles from production in the Hico field, nears completion. It had top of the Cotton Valley at 7,968 ft., and the Bodcaw at 8,460-8,526 ft., with total depth at 8,838 ft. Operators swabbed the well in and it flowed an estimated 4,000,000 cu. ft. of gas per day on ¼-in. tubing choke, plus 5 bbl. of 54°-gravity distillate per hour. Flowing tubing pressure was 2,750 psi., and casing was sealed. Shut-in pressure was 3,200 psi. Perforations were at 8,798-8,818 ft.

Union Producing Co. and Pure Oil Co. 1 Nebo Oil Co., 30-14n-5w, Bienville Parish, completed a number of drill-stem tests, and were drilling ahead below 8,217 ft. in the Travis Peak. At 7,968-8,035 ft., with the tool open 15 minutes, it had a fair blow of air and recovered 40 ft. of mud with no shows. At 7,881-7,945 ft., in 15 minutes the recovery was 40 ft. of mud, cutting a slight amount of gas. Between 7,968-8,035 ft., it recovered the same amount of mud, with no shows. There was no bottom-hole flowing pressure.

Wildcat drilling reports indicated considerable activity but no important changes had been made. In Bienville Parish, Barnsdall Oil Co. 1 Davis Bros., 7-16n-4w, was drilling at 9,234 ft. in Travis Peak. M. T. Halbouty and Stanolind Oil & Gas Co. 1 Bolinger-Boyd, 30-23n-12w, Bossier Parish, had progressed below 5,481 ft. It was out of the Massive anhydrite, by samples, at 5,385 ft. Kerr-McGee et al 1 Frost Lumber, a new Travis Peak wildcat in 14-11n-15w, DeSoto Parish, was drilling below 3,738 ft. It is 4 miles west of the Spider field. The Texas Co. 1 F. J. Rambin, 23-11n-11w, was drilling below 7,601 ft.

Delta Drilling Co. has work under way at its 1 Davis Bros. Lumber Co., a 7,500-ft. test 6 miles northeast of Jonesboro, in 26-16n-3w, Jackson Parish. In Lincoln Parish, Carter Oil Co. 1 Martin Matthews, 22-18n-4w, ran electrical survey to 9,250 ft., then cut 9 sidewall cores between 7,824-9,040 ft., with no shows. It drilled ahead below 9,303 ft. In Webster Parish, Hunt Oil Co. 1 A. C. Burns, 16-23n-9w, was drilling at 8,063 ft. in sand and shale.

In Columbia County, Arkansas, Robert O'Mears 1 Moody, 12-16s-22w, perforated at 7,204-06 ft. but squeezed without testing. Lee & Burnett 1-A Troth, 4-14s-28w, new operation 12 miles north of the Texarkana field, in Little River County, was drilling below 3,069 ft.

ARKANSAS WILDCAT FAILURE

Nevada County: Caddo Oil, Inc., 1 G. H. Christopher, SW SE SE 9-11s-22w, dry, TD 5,258 ft. in Eagle Mills, elev. 295 ft.

NORTH LOUISIANA WILDCAT FAILURES

Concordia Parish: H. L. Hunt 2 Fisher Lumber, SE SW 33-7n-9e, dry, TD 10,229 ft., Austin 9,060-80 ft., base Austin 9,280-90

ft., Tuscaloosa 9,490-9,500 ft., by samples, elev. 64 ft.

Red River Parish: K. M. Menefee 1 V. O. Barlow, SE SW SE 2-14n-12w, dry, TD 2,623 ft., perforated 1,728-29 ft., showed trace of oil, elev. 146 ft.

N. CENTRAL TEXAS

Fifth Oil Well Extends New Producing Area

WICHITA FALLS.—The fifth producer and 1¾-mile extension to the new Strawn producing area 6 miles southwest of Windthorst in Archer County was added this week at L. T. & Bobby Burns 1 J. R. Wilson et al, Block 1,839, TE&L Survey. The new well swabbed and flowed 75 bbl. of oil in 8 hours from the sand section around 3,200 ft. Other details were lacking.

Six miles northwest of Archer City, Akin & Dimock 1 Mrs. J. H. Turbeville, Block 125, John Richards Survey, had prospects of Strawn sand production. A drill-stem test at 3,865-73 ft. showed gas in 30 minutes, and in 1 hour recovered 180 ft. of free oil, with no water. Bottom-hole pressure was 1,900 psi. Details were not available on the first test, from 3,799-3,817 ft., but reports credited it with showing both oil and gas.

Seven miles southwest of Windthorst, R. C. Lipscomb 1 L. A. Snider, Block 2,601, TE&L Survey, tested in the Strawn from 3,071-81 ft., recovering 30 ft. of oil-cut mud in 37 minutes. Operators continued drilling.

In Montague County, R. B. Thrist, Trustee 1 J. H. Cross, Block 16, Limestone CSL, extended the Miller Bend conglomerate field 1 mile east and slightly south, when it recovered 330 ft. of oil, with no water, on a 20-minute test from 6,123-29 ft. Gas showed at the surface in 2½ minutes. A second test from 6,196-6,210 ft. recovered 1,100 ft. of salt water. The well site is about 1 mile southwest of the town of Stoneburg.

In northern Montague County, Los Nietos Co., Dallas, staked location for its 1 Smith, in Block 96, Kaufman CSL, 4 miles southeast of Spanish Fort. It is scheduled to 4,200 ft.

Continental Oil Co. added another producer and extension to its new Caddo limestone field in west-central Clay County at its 3 Scaling, Block 15, HT&B Survey, ¾ mile southeast of nearest production in the area. From perforations between 5,514-27 ft., the well made completion potential of 146 bbl. of 42°-gravity oil in 6 hours, flowing through ½-in. choke.

In northern Brown County, the new producing area 4 miles east of Crosscutt was officially named the Blake Caddo field, and gained two outpost tests. G. C. English, who drilled the discovery well, staked location for the 3-E P. Kilgore et al on the northwest corner of production, 330 ft. from west and 990 ft. from south lines of the east 100 acres of the Kilgore tract in the N. B. Mitchell Survey. The second operation, south of production on the west side of the field, is to be the A. D. Roberts et al, of Shreveport, 3 Mack Henry, 990 ft. from north and 330 ft. from east lines of the west 202 acres in the Seth Ingram Survey 154.

NORTH CENTRAL TEXAS (DISTRICTS 7-B & 9) SUCCESSFUL WILDCATS

Clay County: Wichita River Oil Co. et al 1 Bryant Edwards, S. C. Beldon Sur., A-12, 5½ mi. E Henrietta, pumped 169.1 bbl. 37°-gravity oil a day, oil sand 4,070-4,114 ft., TD 6,316 ft., PB 4,135 ft.

Jones County: Carl Hovgard 1 Lucy Goodwin, Sec. 14, Blk. 1, T&NO Sur., 1½ mi. NW Anson, pumped 6 bbl. 34°-gravity oil a day, lime 2,298-2,307 ft., TD 2,960 ft., PB 2,307 ft.

Palo Pinto County: Crader Oil Co. 1 E. P. Costello, Castleman Sur., 3½ mi. NW Pickwick, flowed 1,500,000 cu. ft. gas a day, sand 1,500-12 ft., TD 1,543 ft., shut-in pressure 650 psi.

Shackelford County: Oil Well Drilling Co. 1 M. Davis, Sec. 36, Blk. 12, T&P Sur., 5 mi. SW Albany, flowed 162 bbl. 44°-gravity oil in 12 hours, ¼-in. choke, casing pressure 365 psi., tubing pressure 375 psi., GOR 770 cu. ft., Ellenburger 4,695-4,715 ft., TD.

Throckmorton County: Woodley Petroleum Co. 1 Ludie Dickie, Sec. 938, TE&L Sur., 2½ mi. NW Woodson, flowed 107 bbl. oil a day, flowed 80 bbl. in 11 hours through 17/64-in. choke, Caddo 4,178-90 ft., TD 4,700 ft.

NORTH CENTRAL TEXAS (DISTRICTS 7-B & 9) WILDCAT FAILURES

Archer County: G. E. Kadane & Sons 1 Frey, Sec. 10, Palo Pinto CSL, 2 mi. N Dundee, dry, TD 5,103 ft., KMA sand 4,130 ft., Ellenburger 5,046 ft.

Brown County: J. C. Hamer 1 L. O. Goss, Sec. 10, BBB&C Sur., 4 mi. SE Rising Star, dry, TD 868 ft. in shale.

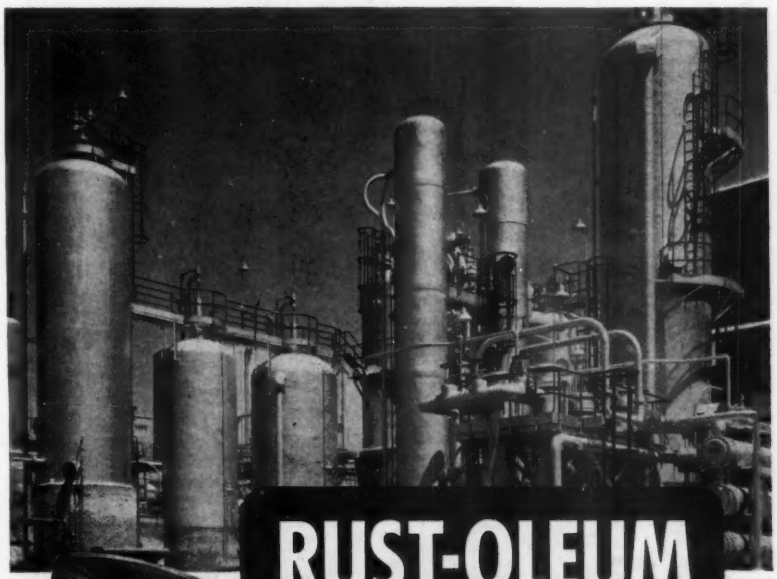
Callahan County: Ungren & Frazier 1 R. L. Griggs, Sec. 122, BBB&C Sur., 2 mi. S Baird, dry, TD 1,615 ft. in shale, coal 1,118-19 ft., sand 1,340 ft. with water.

E. N. Thomasson 1 E. L. Brown, Sec. 78, Bayland Orphan Asylum Lands, 4 mi. NE Baird, dry, TD 650 ft. in sand.

Clay County: S. D. Johnson 1 F. Wines, Lot 4, Blk. 1, Clark & Plumb Subd., 3 mi. SW Halsell, dry, TD 6,105 ft., Mississippi 5,910 ft., Simpson 5,990 ft., Ellenburger 6,087 ft.

Coleman County: R. L. Wheelock, Jr., 1 A. W. Gulley, Blk. 37, Burnett CSL, 2 mi. NW Valera, dry, TD 3,931 ft., Morris sand 2,872 ft., Caddo 3,327 ft., Ellenburger 3,782 ft.

Hasgell County: Pan American Producing Co. 1 J. R. Coody, J. Warfield Sur., Blk. 24, A-431, dry, TD 5,541 ft., Saddle Creek



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Jones County: Tecumseh Oil & Gas Co. et al 1 Cranston, Sec. 11, Blk. 17, T&P Sur., 3 mi. SW Truby, dry, TD 2,718 ft., Dotham 2,000 ft., elev. 1,730 ft.

Nolan County: Skelly Oil Co. 1 L. E. Adrian, Sec. 53, Blk. 20, T&P Sur., 10 mi. SE Sweetwater, dry, TD 6,430 ft., flowed 10 bbl. oil on DST 6,327-6,403 ft., decreased to 1 bbl. oil and 2 bbl. water, Ellenburger 6,335 ft., elev. 2,460 ft.

Shackelford County: Texas Pacific Coal & Oil Co. 1 W. L. English, Sec. 27, University Lands, 2½ mi. NW Moran, dry, TD 4,292 ft., Caddo 3,424 ft., Marble Falls 3,809 ft., Barnett shale 4,030 ft., Ellenburger 4,152 ft., elev. 1,415 ft.

Stephens County: N. C. Beck & Co. 1 A. W. Mueller, Sec. 2,252 ft., TE&L Sur., 5 mi. SE Eolian, dry, TD 3,502 ft. in shale, Caddo 3,290 ft.

Wichita County: Rundell Drilling Co. et al 1, W. A. Brady Sur., A-357, 5 mi. S Burkburnett, dry, TD 1,600 ft. in shale.

MISSISSIPPI

Sun Oil Co. Finds New Salt Dome

JACKSON.—Sun Oil Co. 1 David Gaines Estate, 1-5n-6w, in Greene County, is the discovery well for a new piercement type salt dome, referred to as "County Line." Broken lime cap was first encountered at 1,239 ft., and there was a strong odor of oil in the cuttings from 1,239-47 ft. At total depth of 1,595 ft., electric log was run and 11 side-wall cores were attempted; shows of oil in shale and sandy shale were recovered at 1,238 ft., 1,268 ft. and 1,270 ft. Three drill-stem tests were attempted, with packer at 1,240 ft., but packer failed to hold in each attempt. Operators are now drilling ahead in anhydrite below 1,700 ft.

At Oldenburg, Franklin County, Vaughey et al 1 Mrs. M. E. Hester, 25-7n-2e, after recovering low pressure gas and slight oil show on drill stem on stringer sands above the Lower Tuscaloosa sand, cored shale to 10,500 ft. which was the top of the Massive sand. This sand from 10,509-21 ft. carried oil staining and odor. The water level in this well is below the accepted water level in the other two wells in this field. Operators cored this well to a total depth of 10,527 ft., and completed as dry.

Five new locations were reported this week, all in proven areas, two in La Grange field, Adams County, and one each in Hubb field, Marion County, Soso field, Jasper County, and Yellow Creek field, Wayne County. One wildcat failure was completed in Scott County.

MISSISSIPPI WILDCAT FAILURE

Scott County: Danciger & Gulf 1 M. P. Morehead, 11-5n-6e, dry, TD 10,025 ft. Marine Tuscaloosa 6,720 ft., Base Marine Tuscaloosa shale 6,853 ft., Massive sand 6,980 ft., Comanche 7,037 ft.

GEORGIA WILDCAT FAILURE

Camden County: The California Co. 1 John A. Buie, in unsurveyed area, S 71° W 6,472 ft. from U.S.G.S. bench mark 78 which is located 4½ miles W & slightly S of Tarboro, dry, TD 4,955 ft.

SOUTH LOUISIANA

New Gas-Condensate Pay Found in Valentine Area

NEW ORLEANS.—A new gas and condensate producing area has been opened in the Valentine area of Lafourche Parish by The Texas Co. 1 Luke Guidrez, 51-17s-20e, approximately 5,600 ft. southeast of production in the Valentine field. Drilled to a total depth of 12,780 ft., with 7-in. casing cemented at 11,621 ft., this well flowed 4,860,000 cu. ft. of gas with an estimated 20 to 30 bbl. of 51.4°-gravity condensate daily through a 12/64-in. choke. Flowing pressure on the tubing is 3,850 psi. Production is through perforations at 11,042-090 ft.

A new shallow gas field has been opened on submerged State Leases in Breton Sound area of Plaquemines Parish. Barnsdall-Seaboard-Callery & Hurt 1 Breton State Lease 1,230 on Block 36, just off the northerly shore of Breton Island, is being completed with an estimated flow of 2,500,000 cu. ft. of gas per day through a ¼-in. choke and 1,620 psi. flowing pressure on the tubing. Total depth is 10,609 ft., and production is through perforations at 4,162-68 ft. Nearest production is 11 miles to the southwest in the Grand Bay field.

Kerr-McGee 1 State, Lease 750, Block 28 in Ship Shoal area, 7½ miles south of shore line, Terrebonne Parish, is drilling ahead below 9,461 ft. in hard shale. Shows of oil and gas were encountered from 7,595-7,607 ft., with saturation in the bottom 2 ft. Projected depth is 12,000 ft.

The Texas Co. 4 State-Barataria, located in the Queen Bess Island area of Barataria Bay, Jefferson Parish, has been drilled to 16,068 ft. No details on shows has been announced by operators.

There were 19 new locations reported this week, 3 being wildcat starts, 1 each in Iberia, St. Landry and Terrebonne parishes. Four wildcat failures were completed, one each in Acadia, Avoyelles Lafourche and St. Mary parishes.

SOUTH LOUISIANA WILDCAT FAILURES

Acadia Parish: The Union Sulphur Co., Inc.

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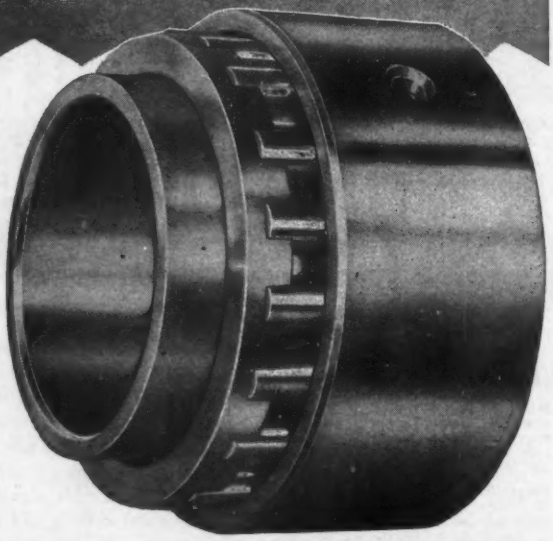

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1 Atteberry, Mowata area, 20-7s-1e, 4 mi. NW of South Bayou Mallet production, 3½ mi. NE of Trinity townsite, dry, TD 9,962 ft.

Avoyelles Parish: Dan J. Harrison, Jr., 1 Arthur C. Lemoine, Plaucheville area, 17-1s-5e, 12 mi. E-NE of Eola field production, dry, TD 9,120 ft.

Lafourche Parish: Union Oil Co. of Calif. 3 City of New Orleans, in Bay Marchand area, 23-23s-22e, dry, TD 12,355 ft.

St. Mary Parish: Humble 2 J. M. Burguieres Co., Ltd., Cote Blanche area, 20-15s-7e, 4 mi. NE of West Cote Blanche field production, dry, TD 14,000 ft.

APPALACHIAN FIELD

United Carbon Stakes Offsets to Discovery

PITTSBURGH.—In Grant district, Jackson County, West Virginia, United Carbon Co. et al has made location for two additional tests on the Nathaniel Waterbury farm as offsets to the large Oriskany gas well completed in early March. The No. 2 starts at an elevation of 934.3 ft. on the Belleville Quad 3.75 miles south 39 degrees .05 minute and 0.65 mile west 81 degrees 35 minutes. The No. 3 starts at an elevation of 951.55 ft., and is located 4.4 miles south 39 degrees .05 minute and 1.3 miles west 81 degrees 35 minutes.

Several good gas wells were completed, among which was Carnegie Natural Gas Co. 1,642 R. M. Moneypenny, Freemans Creek district, Lewis County, with initial gas of 1,344,000 cu. ft. from Gordon sand, total depth 2,785 ft. In Logan district, Logan County, Columbian Carbon Co. completed 988 Island Creek Coal Co. with an initial open flow of 3,984,000 cu. ft. gas, natural, and 10 bbl. oil when shut in. The elevation is 1,244 ft., Big lime 2,183 ft., gas 2,333 ft., total depth 2,336 ft. After being shut in for 14 hours, it was blown open for 30 minutes and the gage then was 6,190,000 cu. ft.

In Jefferson district, Nicholas County, Howard Bartlett completed No. 2 H. C. Kuntz for 1,840,000 cu. ft. gas from the Big lime, total depth 1,712 ft.

In Center district, Wyoming County, United Producing Co. completed 1,458 W. M. Ritter Lumber Co. with a gage of 1,565,000 cu. ft. gas after shooting the Berea at 3,775-3,804 ft. It had a rock pressure of 625 psi. in 48 hours from a total depth of 3,806 ft. In Oceana district, this company completed 1,463 Pardee Land Co. for 4,188,000 cu. ft. gas after shooting the Maxton sand at 2,474-2,553 ft. It rocked up to 590 psi. in 48 hours from a total depth of 2,535 ft.

New locations in West Virginia totaled 15 and were in Union district, Barbour County; Sherman district, Boone County; Washington district, Calhoun County; Union district, Clay County; Grant and Ravenswood districts, Jackson County; Big Sandy district, Kanawha County; Browns Creek district, McDowell County; Jefferson district, Pleasants County; Lincoln and Union districts, Wayne County; Church district, Wetzel County.

In East Fallowfield Township, Crawford County, northeast Pennsylvania, Sylvania Corp. is drilling at 4,487 ft. in the wildcat No. 2 Ellen Calvin with about 8,000 cu. ft. gas showing at 4,405-13 ft. and salt water at 4,425-35 ft. The Tully lime was logged at 3,083 ft., Onondaga 3,235 ft., Oriskany 3,430-48 ft. with salt water which was cased off.

New locations in southwest Pennsylvania totaled 12 and were in Plum and West Deer townships, Allegheny County; Kittanning, Valley any Waynes townships, Armstrong County; Armstrong Township, Indiana County; Allen, Amwell and Carroll townships, Washington County; Allegheny and Bell townships, Westmoreland County.

WEST VIRGINIA SUCCESSFUL WILDCAT

Kanawha County, Elk district: United Fuel

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WEST VIRGINIA WILDCAT FAILURE

Putnam County, Pocatalico district: Godfrey L. Cabot, Inc., 1,255 J. L. McLean Hrs., dry, elev. 807 ft., Corniferous lime 4,766 ft., Oriskany 4,870-4,930 ft., TD 4,953 ft.

SOUTHWEST PENNSYLVANIA WILDCAT FAILURE

Jefferson County, Ringgold Township: Stahlman & Wosker 1 Eliza Gearhart, dry, TD 3,600 ft.

CALIFORNIA

Rocket Petroleum Co. Redefines Kern Bluff

LOS ANGELES.—Rocket Petroleum Co. has extended the new Kern Bluff field of Kern County approximately five or six locations past what previously was thought to be the field limit with its 1 Zinner Community, 12-29s-28e. The well, producing from the Santa Margarita sand at 1,114-97 ft., currently is pumping at the rate of 100 to 150 bbl. daily of 15°-gravity clean oil. Whether or not Rocket's well indicates that production may be extended even farther is uncertain since it is considerably lower on structure than several other wells which have tested wet. Indications are that the well has encountered local faulting, the extent of which can only be determined by further drilling in the area.

Another northwest extension of the old Lompoc field of Santa Barbara County has been chalked up by Union Oil Co. with completion of their 18 Eefson, 28-8n-34w. On initial tests the well produced at the rate of 255 bbl. daily from a total depth of 2,625 ft. Other details have not yet been released. The Lompoc field, discovered by Union in 1903, is a east-west trending anticline with oil occurring in the top of the Monterey shale (Miocene). Development since discovery has been in an east-west direction along the axis of the anticline, and the Eefson property, considerably to the north of production at the western end of the field, has been shut in for more than 20 years. Recently, however, Union has resumed development work at Lompoc on the Eefson, Purisima and Hill properties, all of which have yielded some excellent producing wells in the past few months.

Navy Oil Co. has decided to continue coring for another 50 to 75 ft. in its exploratory venture in the Cuyama Valley area of San Luis Obispo County. The well, 1 Kirschenmann, 12-10n-27w, so far has encountered approximately 45 ft. of oil sand in the Santa Margarita throughout the interval at 4,950-5,024 ft. The sand has been described as "fair," but due to the many failures drilled in the area, other operators are reluctant to become excited about the well until after formation tests have been run. The 1 Kirschenmann is located about 5 miles north of Norris Oil Co.'s recent discovery, which currently is the only producer in the Cuyama Valley area.

CALIFORNIA SUCCESSFUL WILDCAT

Orange County, West Newport area: Donnelly-McGee Oil Co. 1 Madeline, 28-6s-10w, pumped 35 bbl. daily, gravity 10°, water cut 58.0 per cent, 4½-in. tubing 1,100 ft., elev. unknown, TD 1,589 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Sharktooth area: B. C. Mackey 16-1 fee, 16-28s-28e, dry in gray sand, elev. 1,004 ft., top Vedder 3,010 ft., TD 3,030 ft.

Los Angeles County, Newhall area: Bankline Oil Co. 1 Newhall Corp., 31-4n-16w, dry, elev. 1,500 ft., TD 9,996 ft.

WASHINGTON

SEATTLE.—Union Oil Co.'s prospective discovery in the Ocean City area in Grays Harbor County has been filled with mud so that operators may circulate back out of the hole. During the past week the well flowed mud by heads and a very slight amount of light green oil is reported to have been recovered. The well presently is bottomed at 6,278 ft., and 7-in. casing is set to 3,954 ft. A string of 5-in. pipe with 1,700 ft. of perforated liner has been landed at an undisclosed depth. Two weeks ago this well flowed natural gas at the rate of 1,000,000 to 1,500,000 ft. daily, but the flow died after an hour and a half. In going back into the hole, however, operators found that the hole had bridged at several points, leading to the conclusion that the flow can eventually be restored and the well completed as a commercial gas discovery.

TEXAS GULF COAST

Victoria County Gets New Gas Field

HOUSTON.—A new gas field for Victoria County has been opened by Cities Service Oil Co. and Sinclair Prairie Oil Co. 1 Baker, Lot 55, V. Garcia Survey. On a 24-hour gage the well flowed 1,306,000 cu. ft. of gas per day through a 3/16-in. choke, or an estimated 7,400,000 cu. ft. of gas per day on open flow. Total depth is at 6,816 ft., with 5½-in. casing set to 5,334 ft. Production is from the Frio sand with perforations at 5,240-49 ft.

A new oil producing area for Harris County has been opened by Sun Oil Co. 1 Ruby Bossier, in the Rankin area, located 3 miles south of Huffman townsite on the north side of the old Crosby prospect. The well has drilled to a total depth of 8,300 ft., with 5½-in. casing cemented on bottom, and is being completed at 8,155-57 ft., where it flowed approximately 25 bbl. of pipe-line oil per day through a 10/64-in. choke with 400 psi. flowing pressure on the tubing and 155,000 cu. ft. of gas per day.

Seaboard Oil Co. 1 Nick Gabrysch, deep test approximately 4,400 ft. northwest of the Wilcox sand production at Hobson field, in western Karnes County, recovered oil odor and show in cores at 10,968-92 ft. in lime. Three drill-stem tests attempts failed at total depth of 10,992 ft., and the operators set 7-in. casing to test. This test is in Don Erasmo Segin Grant, Abstract 10, and 8 miles west-northwest of Karnes City.

Sun Oil Co. & Skelly Oil Co. 1 Gregg Lawrence has extended production at Sugar Valley field, Matagorda County, westward. Total depth is 11,993 ft., one of the deepest wells yet drilled in the area, plugged back to set 5½-in. casing at 8,856 ft. On initial test through perforations at 8,751-54 ft. it flowed at the rate of 90 bbl. of pipe-line oil daily through a 7/64-in. choke, flowing pressure on tubing 860 psi. Operators are now building tanks for a potential gage.

Phillips Petroleum Co. 1 "Phoenix" (W. P. Belknap, Jr.) has been completed for a good oil producer from the Mackhank sand in the Belknap area, approximately 2 miles northeast of nearest production at Burnell-Wilcox field, in southern Karnes County. On potential gage this well flowed 155 bbl. of 38.7°-gravity oil per day through a ⅛-in. choke, tubing pressure 1,000 psi., casing pressure 1,350 psi., with gas-oil ratio 550. Total depth is 7,250 ft., with perforations for completion at 7,029-32 ft. Top of the sand was at 7,006 ft. This well is in the Charles Haynes Survey.

The 23 new locations for this week included 10 wildcat starts, 2 each in Bee and Matagorda counties, with 1 each in Chambers, DeWitt, Grimes, Harris, Live Oak and Wharton counties. Two exploratory tests were successful, opening an oil pay in Boyce field, Goliad County, and new gas-condensate production in Wharton

County. Six wildcats were failures, three in Victoria County and one each in Karnes, Matagorda and Refugio counties.

GULF COAST TEXAS (DISTRICTS 2 & 3) SUCCESSFUL WILDCATS

Goliad County: New oil pay, Boyce field—Sun Oil Co. 2 A. M. Albrecht, in Vicente Ramos Gr., top pay 4,245 ft., Pettus sand, TD 4,272 ft., perf. 4,245-50 ft., IP: 77 bbl. oil per day through 7/32-in. choke, GOR 800, TP 250 psi., CP 1,000 psi., gravity 45°, trace of water.

Wharton County: Discovery, Egypt, Deep—Claud B. Hamill 1 F. B. & D. Duncan, in Alexander Edgar Sur., TD 7,788 ft., top sand 6,701 ft., Discorbis Yegua, perf. 6,720-46 ft., IP: 100 bbl. condensate per day and 3,085,000 cu. ft. gas per day through a ¼-in. choke, GOR 31,000, open flow calculation 110,000,000 cu. ft. gas per day, TP 2,336 psi., shut-in pressure 2,419 psi., gravity 61.1°, no water.

GULF COAST TEXAS (DISTRICTS 2 & 3) WILDCAT FAILURES

Karnes County: H. R. Smith-Fair & Woodward 1 Mrs. Elnora Thane, in J. B. Baker Sur. 125, in extreme west corner of the county, 7½ mi. northwest of Fashing, 1,500 ft. NE of SW line of county, dry, TD 3,529 ft.

Matagorda County S. A. Brewster & W. O. Bartle 1 Susie LeTulle Rugeley, in Jno. Partain Sur., 2½ mi. SE of Midfields townsite, dry, TD 9,020 ft.

Refugio County: P. R. Rutherford et al 3 J. F. Welder Hrs., in J. M. Blanco Sur., 3 mi. W of Vidauri, 2½ mi. N of Greta field, dry, TD 6,470 ft.

Victoria County: H. M. Amsler 1 Mrs. Agnes West, in M. A. Castano Sur., 4.8 mi. N-NE of Placedo and 1¾ mi. NW of Northeast Placedo field, dry, TD 7,208 ft.

Oil Drilling, Inc. & Sam Dunnam, Jr. 1 R. B. Boos, in M. A. Castanon Sur., 3 mi. E of DeCosta & 4 mi. N of Plaedo, dry, TD 7,200 ft.

Taylor Refg. Co. 1 M. Monte, in A. B. Leatherwood Sur. A-536, 8 mi. E of Victoria, dry, TD 5,912 ft.

CANADIAN FIELDS

Tests at Discovery Delayed by Freeze

CHATHAM.—In the southern Alberta foothills, Canadian Gulf-Pincher Creek 1, LSD 15, 24-3-29w4, on initial tests indicates a large wet gas producer with substantial recovery of 51° A.P.I. distillate. The first 40-minute run through ⅞-in. choke rated 4,000,000 cu. ft. of wet gas with 70 to 100 bbl. per day, and a further run with ⅛-in. choke increased the gas to 11,000,000 cu. ft. per day. Further tests were interrupted by icing of the tubing, due to condensation and freezing of hydrates when gas was released at heavy pressure. De-icing operations continued 5 days, hot oil being forced into the tubing, after which alcohol was tried, and the well blew in with 1,900 psi. tubing pressure and 900 psi. separator pressure.

In the first 24-hour period, distillate recovery was 281 bbl., with successive gas flows of 10,000,000 cu. ft. for 5½ hours, 12,500,000 cu. ft. for 6½ hours and 7,500,000 for 12 hours, the higher rate of yield accompanying the larger flows. At surface, the flow passes through a system of heaters and a high pressure separator, the distillate being run into tanks and the gas into a flare line. After completing a planned series of tests, the hole, bottomed below a 100-ft. porous horizon in the upper Madison at 11,927 ft., will be deepened. The producing horizon is thought to correspond to the upper porous of Turner Valley, and the well is strikingly similar to Royalite 4, gas-cap producer, which, in 1924, started the deep lime production of that field.

Leduc.—Up to the end of February the

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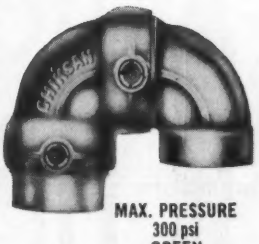
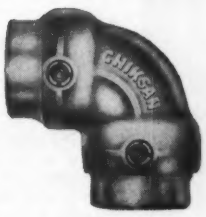


MAX. PRESSURE 300 psi GREEN



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Leduc field had produced a total of 636,988 bbl. since February 13, 1947, including 187,873 bbl. from the D-2 zone and 449,115 bbl. from the D-3 zone. D-2 zone had 26 producers, including 24 Imperial wells, and D-3 had 26 producers, with 14 Imperial wells. Daily production in February was 4,907 bbl.

The field has been extended ¼ mile west by Globe-Leduc West 7, LSD 5, 19-50-26w4, where drill-stem test of the D-2 zone at 5,120-48 ft. gave 165,000 cu. ft. of gas per day with 4,600-ft. recovery of clean oil after 1 hour. Another extension to the south is indicated by Okalta 2, LSD 10, 33-49-26w4, which got the D-2 zone at 5,162 ft. with good porosity at 5,165-75. After drill-stem test, the hole will be deepened to the D-3. Another outpost well to the South, Imperial 9, LSD 16, 3-50-26w4, had successful drill-stem test in the D-3, and is swabbing and testing at 5,466 ft. Imperial 41, LSD 15, 16-50-26w4, finished at 5,410 ft., has gone on restricted production after making open flow around 528 bbl. Imperial 32, LSD 16, 22-50-26w4, is testing production at 5,333 ft.

Atlantic Oils 3, LSD 12, 23-50-26w4, which blew wild from 5,267 ft. with a large gas flow, again caused trouble, apparently from the Viking sand, when gas escaped through the casing and bubbled from the ground at points as far as 300 ft. from the derrick. Possible cratering was halted by heavy cementing, and the well will be left standing until spring.

Taber.—In the Taber field, southern Alberta, California Standard - Province 74-15A, LSD 5, 15-9-17w4, has finished in the Taber sand at 3,231 ft. after a 1-hour drill-stem test gave 630-ft. rise of oil with gas and no water. Province 86-16A, LSD 4, 16-9-17w4, got water and oil scum in the limestone at 3,332-42 ft. and is being abandoned.

Eyot.—About 8 miles southeast of the Leduc field, Imperial-Eyot 1, LSD 2, 28-48-25w4, is coring the Lower Cretaceous below 4,593 ft. after encountering oil and gas with a little water. The test will be deepened to the Devonian limestone, producing horizon of the Leduc field.

Northern tests.—Efforts by Imperial Oil to develop Devonian production north of Edmonton are being continued with location of Imperial-Clyde 1, LSD 9, 29-59-24w4, about 8½ miles north of recent unsuccessful tests near Legal, and about 35 miles north of Edmonton. Two other northern tests are Imperial-Fedorah, LSD 13, 22-47-23w4, below 2,458 ft., and Imperial-Volmer, LSD 2, 16-55-25w4, below 2,514 ft.

Texaco tests.—The first two joint tests by Texaco Oil Co. and McColl-Frontenac Oil Co. have been located in north-central Alberta. Texaco-McColl Calmar 1, LSD 6, 36-49-27w4, is 4 miles south and west of the Leduc field. Texaco - McColl Majeau Lake 1 is 40 miles northwest of Edmonton, in LSD 12, 1-57-3w5.

Saskatchewan. — Husky Refining Co. of Lloydminster has located two new tests in the Lone Rock section of the Lloydminster field. Husky-Lashburn 3, SW 9, 15-47-27w3, will offset No. 2 producer, and another well will drill in SW 10, same section.

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KANSAS

Stafford County Gets Pool Opener

PHIL-HAN OIL CO. appears to be giving Stafford County a pool opener at 1 Hufford, SW SW NW 33-21s-13w, about 1½ miles southwest of the Gates pool. The well cut the Arbuckle at 3,335 ft. and at a total depth of 3,370 ft., operator got 1,100 ft. of oil in the hole in less than 30 minutes.

In Barton County, M & L Oil Co. may have a pool opener with 1 Wagner, NE NE SW 23-19s-12w, about 1½ miles north of the Hammer pool. Arbuckle was topped at 3,367 ft. At a total depth of 3,378 ft. the well was reported bailing 2 bbl. of oil per hour.

The discovery well of the Garfield pool, Lindas Oil Co. 1 Hutchinson Estate, SE SE NW 17-23s-17w, Barton County, has been assigned an official rating of 44 bbl. of oil per day from the Kinderhook at total depth of 4,314 ft.

In Rush County, Westgate-Greenland Oil Co. 1 Ochs, SW SW NW 21-17s-16w, swabbed 2½ bbl. of oil per hour with casing set at 3,734 ft. and total depth of 3,741 ft. Well will be acidized.

The East Barry pool in Rooks County has a good well in Atlantic Refining Co. 1 Holmes, SW SW NW 5-8s-18w, which is swabbing at the rate of 21 bbl. of oil per hour from the Arbuckle following acid treatment. Pay zone was cut at 3,495 ft. and total depth is 3,504 ft.

For the week, a total of 54 locations were recorded. Butler County led with 7 locations followed by Rice with 6. Five each were recorded for Grant and Russell counties.

KANSAS WILDCAT FAILURES

Butler County: Shell Oil Co. 1 Vestring, NE SW SW 19-24s-8e, dry, TD 2,778 ft., no tops reported.

Cowley County: Kewanee Oil Co. 1 Branson, SE SES SE 29-32s-7e, dry, TD 2,922 ft., Brown lime 2,320 ft., Mississippian 2,871 ft.

Ellis County: Jones, Shelbourne & Farmer 1 Richards, SE SE NW 5-11s-18w, dry, TD 3,403 ft., anhydrite 1,410 ft., Topeka 3,038 ft., Kansas City 3,305 ft.

Marion County: K. T. Ingling et al 1 G. Jost, SW NE SW 22-19s-2e, dry, TD 3,010 ft., Mississippian 2,568 ft., Viola 2,974 ft.

Pasternack 1 Goossen, SW SW SW 26-20s-1e, dry, TD 3,885 ft., Lansing 2,204 ft., Mississippian 2,818 ft., no shows.

Brannie & Goering 1 Lathrop & Hawk, NE NE SE 26-21s-3e, dry, TD 2,768 ft., Lansing 1,910 ft., Basal Kansas City 2,238 ft., Cherokee 2,429 ft., conglomerate 2,461 ft., Kinderhook 2,609 ft., Missis-

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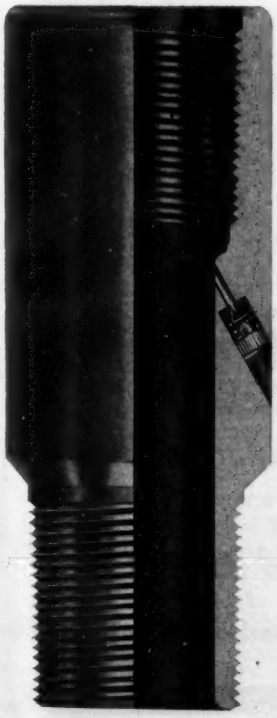

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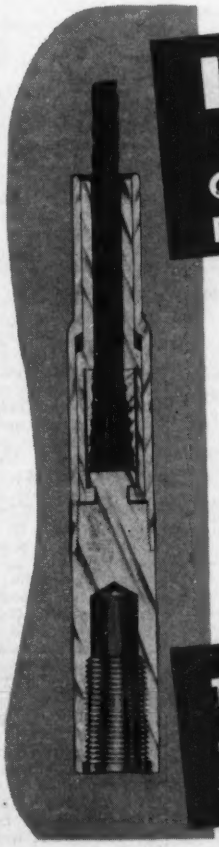

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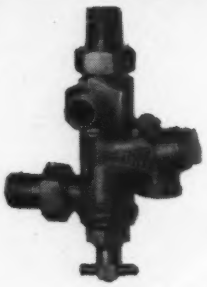

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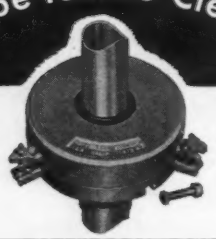

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ROCKY MOUNTAIN

Western Natural et al Testing Utah Wildcat

DENVER.—Testing is now being conducted by Western Natural Gas Co., Byrd-Frost, Inc., and Paul B. English at the wildcat on the Boundary Butte structure in southeastern Utah. The well is 1 English-Tribal, C NE NW 22-43s-22e, and 7-in. casing has been cemented at 6,090 ft., total depth. At this depth the well is believed to be in Devonian, although no formation tops have been released below the Coconino at 1,652 ft. It is reported that shows of oil were encountered around 5,700 ft., and oil and gas showed on drill-stem tests between 5,730-5,850 ft. On another test between 5,860-5,975 ft., the well is reported to have made 3,200 ft. of salt water. Gas shows were encountered around 4,600 and 5,200 ft. A well drilled on this structure by Midwest Oil Co. and Continental Oil Co. a number of years ago reportedly made volumes as high as 10,000,000 cu. ft. of gas daily but the well was abandoned. The Western Natural et al well is now being perforated and tested in zones up the hole, with the operation a tight hole and no report of results.

This is the second important operation by these companies in the San Juan Basin of Utah. A deep wildcat test of the Boulder Knoll prospect, 50 miles north, was abandoned in the Mississippian at 8,678 ft., total depth. Location for the Boulder Knoll well was based on seismic research, and the Boundary Butte wildcat is reportedly the result of surface geology. These operators, and as many as 20 other companies, have accomplished a great amount of geological and geophysical work in the San Juan Basin of Colorado, New Mexico, Utah and Arizona in the past 2 years, and several wildcat wells are now scheduled for drilling in the area.

Another important deep wildcat for eastern Utah is The California Co.'s Upper Valley test at 1 Unit, C SW NW 12-36s-1e, Garfield County. This well, which had a fishing job for several weeks, is now drilling below 6,600 ft. Top of the Coconino was found at 6,152 ft. and 9⅝-in. casing has been cemented at 6,041 ft. Tests in the Kaibab below 6,041 ft. reportedly found only water. This well is now believed scheduled to be drilled below 10,000 ft.

In northeastern Utah, Carter Oil Co. has abandoned its third Vernal Unit wildcat, the 1 Schmidt, C SE NE 28-4s-20e, Uinta County, at 6,370 ft., total depth. Top of the Mancos was reported at 6,130 ft. This well encountered several shows of oil but on tests these were not commercial. The play by Carter in this area has been based on stratigraphic trap of beds against the Uintah uplift. Two previous wells were abandoned after testing shows of both oil and gas in the lower Mesa Verde section. The operator is now drilling a fourth test at 1 Nelson, C SE SW 33-5s-21e, and this well is below 4,400 ft.

Evidence of a new pay and an extension to production in the Pilot Butte field is furnished in the Brikerhoff Drilling Co. 1 Healin, NW SW NE 15-3n-1w (WRM), Fremont County, Wyoming. This well topped the Muddy sand at 3,932 ft. and on drill-stem test between 2,940-80 ft. made 150 ft. of oil and 90 ft. of oil-cut mud in 50 minutes. The oil is 43° gravity. This is the first Muddy oil production to be found at Pilot Butte, although this formation has shown large volumes of gas in wells on top of the structure. Shows of oil have been reported in other Muddy sand wells, but these were not commercially productive. The majority of oil production in the Pilot Butte field is from the Tensleep sand. Brinkerhoff is now drilling below 3,200 ft. and may drill the test to the Tensleep before more thoroughly testing the Muddy zone.

Location for an important Kibbey sand wildcat west of the Ragged Point field has been made by The Texas Co. at 1 Northern Pacific Railroad, C SW SE 13-11n-27e, Howard Coulee, Musselshell County. This well is approximately 10 miles west of Texas' Kibbey sand discovery well at Ragged Point which was completed 3 months ago as an important producer for Central Montana. Texas' second Ragged Point well, a south offset to the discovery, is now flowing 16 bbl. of oil hourly following a treatment of 2,000 gal. of acid. The well topped the Kibbey at 4,433 ft. with total depth at 4,577 ft. It is reported that several tests of the Big Snowy group will be drilled during the next year on structures in central Montana which have previously been tested only to shallow formations.

New operations.—New locations totaled 23: 15 in Wyoming, 4 in Montana, 3 in Colorado, and 1 in Northern New Mexico. In Wyoming Clark Drilling Co. made location for the third well in the Fiddler Creek area, 6 miles northwest of the Mush Creek area. Two previous tests were dry in the Newcastle. Eight new locations in the Mush Creek area were made, with the majority extension tests on the south and west sides of the field. Fourteen rigs are now operating in this field. All other locations were for pool wells in Wyoming, Montana, and Colorado.

WYOMING WILDCAT FAILURE

South Steamboat, Fremont County: Tide Water Associated 41-16 Tribal, NE NE NW 16-3n-1w (WRM), 6,147 ft. TD, dry, Muddy 4,622 ft., Dakota 4,936 ft., Fuson 5,003 ft., Lakota 5,237 ft., Morrison 5,290 ft., Sundance 5,453 ft., Gypsum Springs 5,867 ft., Nugget 6,007 ft., elev. 5,622 ft.

UTAH WILDCAT FAILURE

Boulder Knoll, San Juan County: Western Natural Gas, Byrd-Frost, Inc., P. B.

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English 1 Redd, C SE NE 23-34s-25e, 8,678 ft. TD, dry. Shinarump 2,560 ft., Hermosa 4,346 ft., Paradox 5,695 ft., Molas 7,965 ft., Madison 8,110 ft., elev. 6,805 ft.

OKLAHOMA

Okfuskee Wildcat Has Good Viola-Dense Show

SKELLY OIL CO. has indications of a pool opener at 1 Bombarger, SW NE SE 12-13n-7e, Okfuskee County, where a drill-stem test recovered 3,300 ft. of 28° gravity oil. Viola lime was topped at 4,025 ft. and the Dense at 4,040 ft. Test was made when hole had reached a depth of 4,059 ft. and packer was set at 4,026 ft. Operator is coring ahead below 4,059 ft. and will test the Wilcox.

Testing continues at Stanolind Oil & Gas Co. 1 Briscoe, C NW SE 4-4n-8w, Grady County. Well was reported flowing at an estimated rate of 11 bbl. per hour through a ¾-in. tubing choke. Production is from basal Bromide and upper McLish at 13,673-14,192 ft. Testing will continue for a week or more.

In eastern Oklahoma County, L. C. Tharpe has prospects for either a new pool or a southwest extension of the Jones field at the 1 Lovell, SE NW SE 29-13n-1e. Cleveland sand was cut at 4,885 ft. and operator reports saturation. Drilling was halted at 4,896 ft. and casing will be set to top of sand.

The Northwest Perry pool in Noble County has been extended to the north by Warren Oil Corp. et al 1 J. P. Keyser, SE SW SW 5-21n-1w. The estimated production of 50 bbl. per day is from the Simpson dolomite, topped at 5,156 ft. Total depth is 5,177 ft.

Fordee-Rhodes Oil Co. and Charles Walbert et al 2 Burnside, SE NW SE 26-23n-1w, Noble County, topped the Bartlesville at 4,412 ft. and showed good porosity and saturation to 4,468 ft. and fairly porous and saturated sand to 4,474 ft. Casing has been cemented to 4,400 ft. and total depth is 4,476 ft. Production at the 2 Burnside would be another step toward linking the South Ceres and Southeast Ceres pools.

OKLAHOMA SUCCESSFUL WILDCAT

Stephens County: Magnolia 5 Hanson, NW NE NW 12-1s-4w, pumped 149 bbl. 31.3°-gravity oil per day from Springer sand at 4,695-4,800 ft., TD 5,270 ft.

OKLAHOMA WILDCAT FAILURES

Carter County: Taylor 1 fee, NW NE NW 24-3s-3w, dry, TD 2,070 ft., no tops reported.

Cleveland County: Sinclair 1 White, C SE NE 20-9n-3w, dry, TD 8,895 ft., Haragan 8,595 ft., Chimney Hill 8,839 ft., Sylvan 8,886 ft.

Cotton County: Hutcheson 1 Algood, C SE SW 17-3s-12w, dry, TD 2,012 ft., no tops reported.

Creek County: Mid-Continent 1 Armstrong, NW SW NE 10-19n-7e, dry, TD 2,748 ft., Inola 2,637 ft., Bartlesville 2,671 ft. with no shows.

Grady County: Berkey 1 Bryan, NE SE SE 10-5n-7w, dry, TD 2,305 ft., sand 2,253-73 ft., no shows.

Hughes County: Mora 1 Talbert, SW SW SE 35-8n-10e, dry, TD 2,572 ft.

Jefferson County: Falcon Seaboard 1 Beavers, SW SW NW 27-3s-6w, dry, TD 3,815 ft., Arbuckle 3,705 ft., no shows.

Oklahoma County: British-American 1 Holmes, SE SW NW 29-14n-2w, dry, TD 6,572 ft., Oswego 5,989-6,070 ft., Prue 6,072-86 ft., Bartlesville 6,215-30 ft., Haragan 6,280 ft., Sylvan 6,428 ft., Viola 6,518 ft.

Payne County: Fleet Drilling 1-A School Land, SW SW NW 16-18n-3e, dry, TD 4,050 ft., Upper Layton 2,670 ft., Lower Layton 3,030 ft., Checkerboard 3,290 ft., Oswego 3,620 ft., Prue 3,750 ft., Inola

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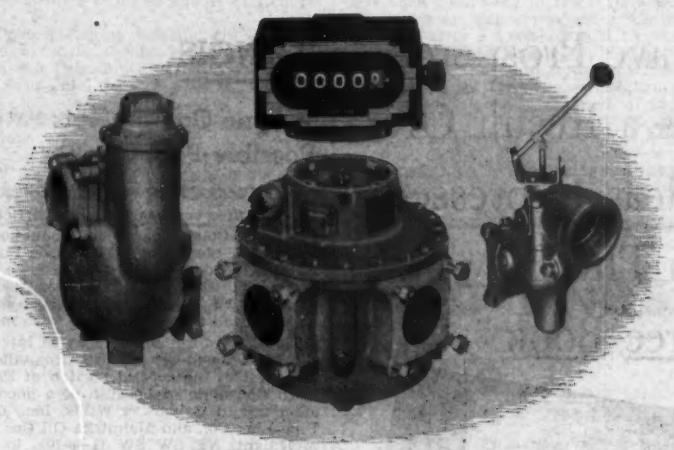
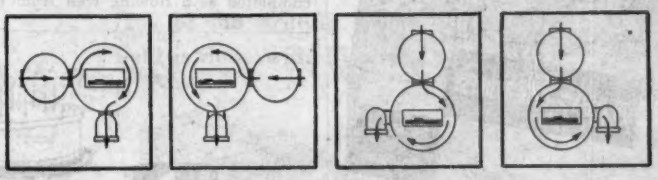


gives you all these:



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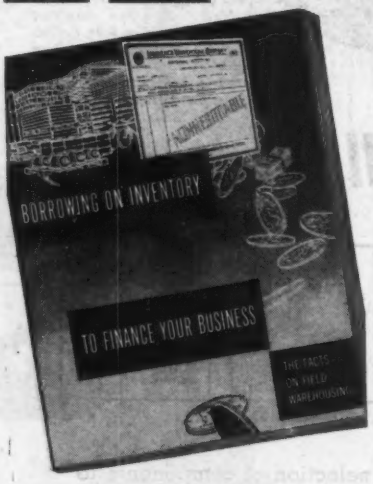

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3,925 ft., Upper Bartlesville 3,975 ft., Lower Bartlesville 4,007 ft.

Pottawatomie County: Delaney 1 Noland, SW SW SW 33-6n-4e, dry, TD 4,093 ft., Pawhuska 1,015 ft., second Pawhuska 1,097 ft., Belle City 1,858 ft., Hogshooter 2,257 ft., Checkerboard 2,370 ft., Wanette 2,947-80 ft., Mayes 3,184 ft., Woodford 3,206 ft., Hunton 3,590 ft., Sylvan 3,610 ft., Viola 3,665 ft.

Stephens County: Vierson 1 Urfer, NE NE NW 3-1n-6w, dry, TD 7,325 ft., no tops reported.

ILLINOIS

Wayne County Gets Possible Pool Opener

MATTOON.—A new pool is indicated for the area southeast of the Fairfield pool in Wayne County based on production during a drill-stem test at Robinson-Pucket 1 Arthur Wood, S½ NE NW 16-2s-8e. On a 1-hour drill-stem test of the Aux Vases sand at 3,177-3,202 ft., gas showed in 4 minutes and the well flowed clean oil in 25 minutes.

There has been some renewed interest in the area northeast of the Crossville pool and west of the central portion of Phillipstown Consolidated because of a good drill-stem test at Calvert & Willis, Inc., Central Pipe Line Co., and Mahutska Oil Co. 1 Fred McKnight, NE SW SW 11-4s-10e, in White County. Casing has been set to test the McClosky lime at 3,129-34 ft. after a drill-stem test at 3,107-44 ft. had gas in 14 minutes and a recovery of 450 ft. of oil and 180 ft. of oil-cut mud in the 1-hour test.

Gilliam Drilling Co. 2 Sietz et al, W½ NW SE 23-1s-13w, Wabash County, has been completed as a flowing well from the McClosky at 2,600-06 ft. Initial production is 375 bbl. per day through ½-in. choke.

In Wayne County near the Geff pool, F. L. Strickland and Nash Redwine 1 Schuman, W½ NW NW 14-1s-7e, is testing the Aux Vases sand. The well is reported swabbing 10 bbl. of oil per hour after a 40-qt. shot.

ILLINOIS WILDCAT FAILURES

Fayette County: Texas Co. 1 M. Harper, SW SW SE 32-9n-2e, dry, TD 2,002 ft.

Clay County: Reliable Oil Co. 1 F. Burt, NW NW SE 36-3n-6e, dry, TD 3,090 ft.

Greene County: Joe Kesl, Jr., 1 Harr, SW SE NE 9-11n-10w, dry, TD 400 ft.

Wayne County: Tully & Carter 1 Thomas, NE NW SW 20-2s-7e, dry, TD 3,420 ft.

Washington County: Inland Oil Co. 1 Groennert, NW NW SW 28-1s-3w, dry, TD 1,486 ft.

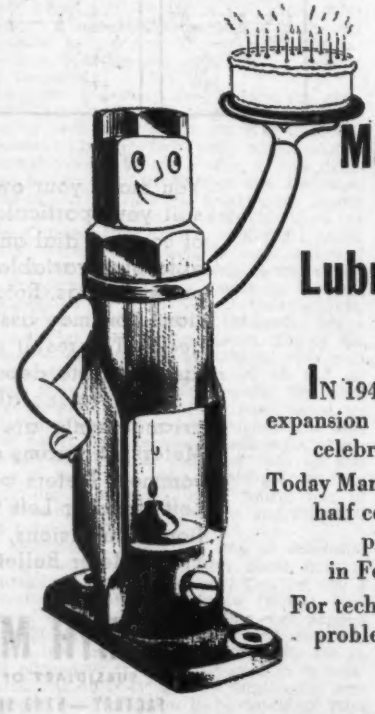
A. M. Fowley 1 A. Piotrowski, NE SW SE 1-3s-2w, dry, TD 1,423 ft.

MICHIGAN

New Pool in Bay County Continues Fast Development

SAGINAW.—Swan-King Oil Co. is acidizing its third producer in the new oil pool developing along a narrow Dundee view in Bay County. The 1 Peterek offset, ½ mile northeast of the 1 Amyotte discovery, flowed by heads from 2,830 ft., about 30 ft. higher than the Amyotte and the southwest offset, 1 Kurcza, which came in in February. With pressure holding steady, production of the Amyotte and Kurcza is being restricted to about 125 bbl. a day.

With the pool thus proven for a little over a mile northeast-southwest, Swan-King has two other wells drilling, and is planning to start another two. Leonard



Manzel Celebrates 50 Years of Lubrication Know-How

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Oil Co. of Mt. Pleasant also has a well in progress. Since the Amyotte, producing only 200 ft. from the fourth successive dry hole drilled in Swan-King explorations, the company completed one other well as a dry hole.

Six completions elsewhere in Michigan were reported for the week. Two were producers, one pumping 35 bbl. a day in Akron Township, Tuscola County, the other a 10-bbl. well in Clayton Township, Arenac County. Two of the four dry holes were wildcats.

Six new drilling permits were issued by the state for two wells in Allegan County, and one each in Bay, Midland, Ottawa, Newaygo and Van Buren counties.

Michigan Oil and Gas Association, releasing February production figures, said 3,523 producing wells in the state averaged a total of 43,655 bbl. a day. Best averages are in Deep River field, where 106 wells average 78 bbl. a day, and Coldwater field where 76 wells are producing an average of 74 bbls a day.

MICHIGAN WILDCAT FAILURES

Clare County, Lincoln Township: Turner Petroleum Corp. 1 Jane Silover, NE NW NW 8-18n-5w, dry in Dundee, TD 4,086 ft.

Kent County, Wyoming Township: Rex Oil & Gas Co. 1 Charles Edema, NE NW SW 34-6n-12w, dry in Traverse lime, TD 2,001 ft.

OHIO, KENTUCKY

Large Drilling Campaign Planned in Knox County

COLUMBUS.—Jackson Township, Knox County, has taken on an increased interest for the operators of the Somerset and Brush Creek fields in view of the good oil production in the north half of the township, and the recent gas in the south part. All available acreage is now leased and a number of wells are planned for starting soon. Two wells were drilled in during the week: Preston Oil 2 Ray Earlywine, Section 8, found the Clinton at 2,900-43 ft. with a good showing of oil which is to be shot; Shuff & Bucy 3 Clara Miller, Section 8, was completed as an 87-bbl. well after shot.

The National Gas Co. found a gas pay in the Clinton in the U.S.A. 36, Section 4, Blue Rock Township, Muskingum County. The sand was logged at 4,163-4,227 ft. with a natural open flow of 1,750,000 cu. ft.

Small et al found two small showings of gas in a wildcat 2 miles west of the Navarre pool at the 1 C. M. Smith, Section 35, Tuscarawas Township, Stark County. The Shell formation at 4,119-33 ft. showed 12,000 cu. ft. and the white Clinton at 4,210-42 ft. 37,000 cu. ft. Both shows were shot and in ½ hour the gage was 1,629,000 cu. ft. A further test will be made.

John Morrow et al are drilling ahead at 2,000 ft. on their wildcat on L. F. Murray, Section 12, Meigsville Township, Morgan County. A collapsed pipe held them up for a short while.

Twenty-four locations were reported from 13 counties. Perry led with 6 and was followed by Athens with 5. Cambridge field led in completions with 7 out of 27.

EASTERN KENTUCKY

ASHLAND.—Four completions were reported during the week in the Eastern Kentucky field, one of them topping the 2,000,000 mark. Kentucky-West Virginia Gas Co. completed well No. 891, J. N. Taylor, Pike County, at 2,953 ft. for 2,523,000 cu. ft. in shale, A.S.

The same company completed Well No. 888, W. D. Hall, Knott County, at 3,843 ft., 63,000 cu. ft. gas in shale, A.S.; No. 5,183, R. E. Robinson, Pike County, at 3,363 ft., 231,000 cu. ft. gas in shale, A.S.; No. 5,792, Elijah Johnson, Floyd County, at 3,389 ft., 61,000 cu. ft. gas in shale.

WESTERN KENTUCKY

OWENSBORO.—Sun Oil Co. has completed 1 Lillie Binford, SW NE SE 23-O-19, Union County, for an initial production of 14 bbl. per day from the Pennsylvania sand at 1,406-19 ft. This well opens a new pool that has been named Morganfield, South.

In Henderson County Carter Oil Co. has a new wildcat location, 1 J. R. Rash in 19-P-24, about 5 miles southeast of Henderson, Ky.

In Daviess County Ashland Oil & Refining Co. 5 Jacobs, 7-P-28, is going on pump to test the Palestine at 1,018-23 ft. after a 10-qt. shot. Total depth is 1,024 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Union County: Sun Oil Co. 1 Lillie Binford, SW NE SE 23-O-19, IP 14 bbl., Pennsylvania sand 1,406-19 ft., TD 1,419 ft.

INDIANA

EVANSVILLE.—Vanderburgh County had several good completions for the week. J. B. Buchman and C. E. O'Neal have completed 3 C. N. Raben, SW NE W½ NW 6-5s-11w, for an initial production of 192 bbl. per day from the Cypress at 2,246-58 ft., and 2 Lena Wassmer et al, NW NE W½ SW 6-5s-11w, for 86 bbl. per day from the Cypress at 2,250-61 ft. Johnston Drilling Co. 1 F. Nurrenbern, NE NW NE 6-7s-11w, has been completed in the O'Hara at 2,505-16 ft. for an initial production of 122 bbl. per day after a 5,000-gal. acid treatment.

Some renewed activity in the northeastern part of the state is evident from this week's reported completions in Miami County. Three oil wells in the area of the Peru field and a dry hole northeast of the field were included in the list of completions.

INDIANA WILDCAT FAILURES

Vanderburgh County: Aurora Gasoline Co.

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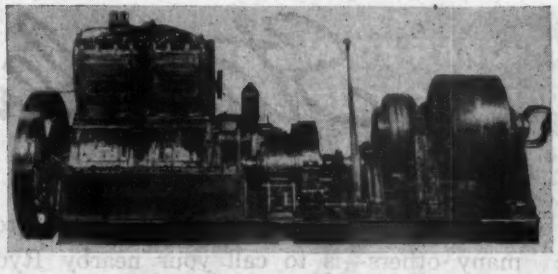

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1 Edgar Taylor, NW NE NE 6-5s-11w, dry, TD 2,650 ft.

Wells County: Nelson Huffman 1 fee, SE NE SE 6-25n-11e, dry, TD 1,034 ft.

PERMIAN BASIN

Sun Well Plugs Back To Marble Falls Zone

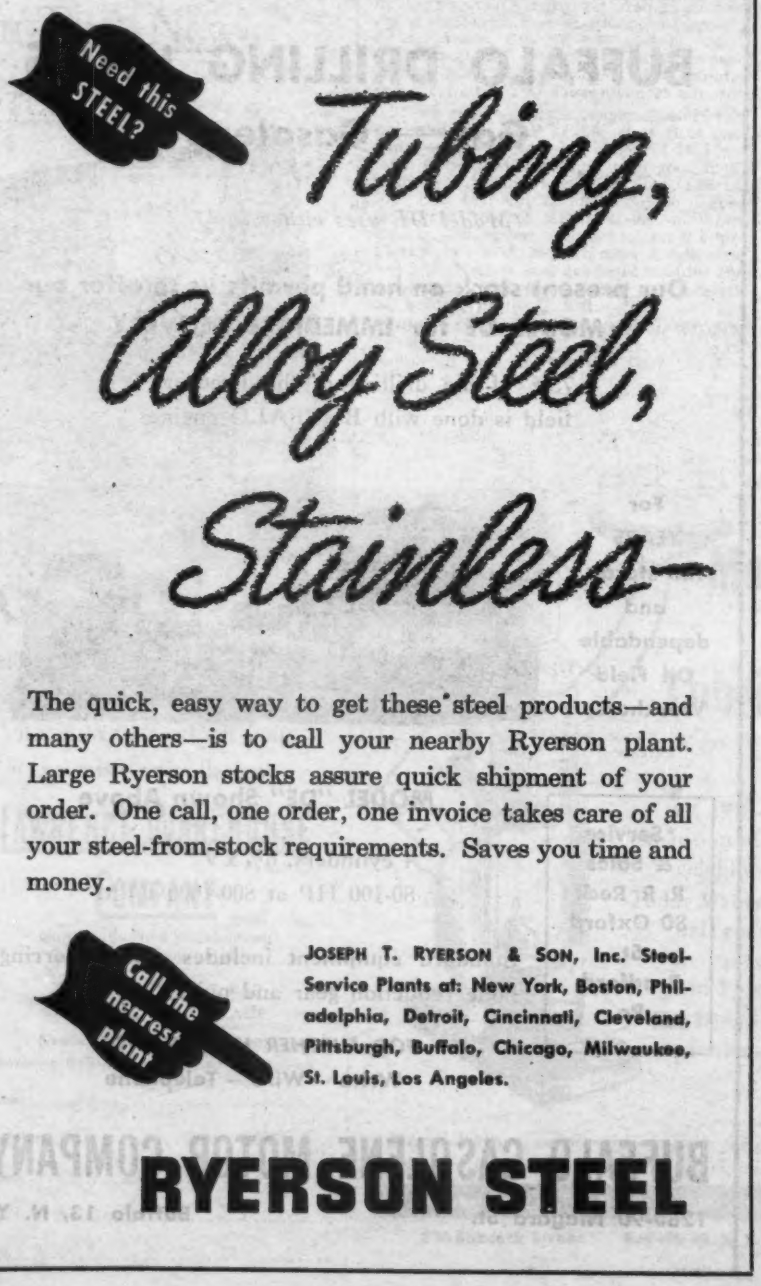
MIDLAND.—Sun Oil Co.'s 2 J. W. Arledge, northeast offset to its Marble Falls discovery, in northern Coke County, found sulfur water in the Ellenburger, and was to try for completion in the Marble Falls, where it had only fair shows for commercial production. Entering the Ellenburger at 6,890 ft., a 1-hour drill-stem test from 6,912-23 ft. recovered 23 ft. of mud and 300 ft. of sulfur water, with a trace of oil. Bottom-hole flowing pressure was 150 psi. Operators had cored from 6,913-23 ft., recovering 2½ ft. of light gray-green dolomite and 7½ ft. of light gray and brown dolomite, with good porosity and good odor. After the drill-stem test, electrical survey was run and the hole plugged back to 6,700 ft., and casing cemented to 6,688 ft.

In the South Jameson field, 1,700 ft. southwest of the field opener, Sun's 1 Central National Bank of San Angelo cored 5 ft. of porous limestone, which was first thought to be the Marble Falls, from 6,722-38 ft., later identified as Reef limestone. Packer was set at 6,645 ft. and a drill-stem test to 6,748 ft. recovered 480 ft. of oil and 540 ft. of salt water. Operators cased off the Reef limestone section, with pipe set to around 6,712 ft., and ran an all-night test on the Marble Falls from 6,729-36 ft. This section looked promising when it put gas to the surface in 6 minutes, and oil and mud in 37 minutes. However, there was little drive and after flowing approximately 4 bbl. of oil and 5 bbl. of water in 1 hour, the flow died. Recovery was around 480 ft. of oil and more than 5,000 ft. of salt water.

Simpson production offsetting the Jordan Ellenburger discovery well to the southwest, in southern Ector County, was reported at The Texas Co.'s 33 W. E. Connell, Section 1, Block B-22, PSL Survey. A drill-stem test of 1 hour and 10 minutes from 8,830-60 ft. showed gas at the surface in 4 minutes, and oil in 16 minutes. Fifty-two barrels of oil were recovered during the next 45 minutes. Operators then drilled to 8,928 ft., and a second test was made with packer at 8,900 ft. Recovery was 30 ft. of drilling mud with no shows. Ellenburger was topped at 8,928 ft., and drilled to 8,943 ft., where a third test was to be made.

On the southeast side of the Shipley (Silurian) field of Ward County, Gulf Oil Corp. 8-E Wristen Bros., Section 2, Block 5, H&TC Survey, recovered oil on a drill-stem test of the Devonian at 6,284-6,325 ft. The tester was open 2½ hours, recovering 120 ft. of clean oil, 180 ft. of heavily oil and gas-cut drilling mud, and 30 ft. of slightly oil-cut mud. Operators were to drill ahead and continue testing. The well was originally scheduled to the Ellenburger.

In southeastern Andrews County, The Texas Co. 1 J. E. Mabee, Section 24, Block 39, G&MMB&A Survey, 5 miles north of the Mabee field, recovered 630 ft. of water-cut mud and 270 ft. of salt water on a 2-hour drill-stem test of the San Andres from 4,770-4,885 ft. Operators were running electrical survey.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WEST TEXAS (DISTRICTS 8 & 7-C) WILDCAT FAILURES

Crockett County: C. W. Brown 1 Robertson-Fitting, Sec. 3, Blk. SK, TCRR Sur., 20 mi. SW Ozona, dry, TD 1,045 ft. in lime.

The Texas Co. 1 State U, Sec. 22, Blk. 40, University Lands, 3 mi. S Barnhart, dry, TD 9,197 ft., PB 2,120 ft., anhydrite 860 ft., Yates 960 ft., Grayburg 1,510 ft., San Andres 1,610 ft., Ellenburger 8,690 ft., elev. 2,655 ft.

Crosby County: Ohio Oil Co. 1 Morgan Jones, Sec. 140, Blk. 2, H&GN Sur., 9 mi. SE Crosbyton, dry, TD 8,634 ft., Strawn lime 7,885 ft., Mississippi 8,100 ft., pre-Cambrian 8,616 ft., Cambrian 8,630 ft., elev. 2,579 ft.

Pecos County: Guy Mabee Drilling Co. 1 W. N. McEver Estate, Sec. 109, Blk. 8, H&GN Sur., 9 mi. S Grand Falls, dry, TD 600 ft.

Sterling County: Cities Service Oil Co. 1 Collins, Sec. 71, Blk. 17, SPRR Sur., 4 mi. N and 2 mi. W Iolanthe, dry, TD 8,195 ft., San Andres 1,740 ft., Glorietta 2,260 ft., Clear Fork 2,430 ft., Ellenburger 8,142 ft., elev. 2,395 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Gulf Oil Corp. 6 C. E. LaMunyon-Federal, NE NE 28-23s-37e, McKee sand discovery in Lea County, made completion potential of 900 bbl. of 41.5°-gravity oil a day, flowing through ¾-in. tubing choke, from the section at 9,340-9,510 ft. Gas-oil ratio was 649 cu. ft. Top of the McKee was logged at 9,344 ft., and perforations in the 170-ft. section were 9,340-65 ft., 9,385-9,410 ft., 9,440-80 ft. and 9,490-9,510 ft., with a total of 660 shots.

Skelly Oil Co. this week spudded in at its 7 R. R. Sims, 11,000-ft. Ellenburger test in Penrose-Skelly field of southeastern Lea County. It is 2,200 ft. from south and west lines of 3-23s-37e, and 3½ miles south of Ellenburger production in the Brunson field.

Amerada Petroleum Corp. 8 H. W. Andrews, 12-20s-36e, reached 10,827 ft., in an unidentified limestone, then plugged back to 10,488 ft. to set casing.

SOUTHEASTERN NEW MEXICO WILDCAT FAILURE

Chaves County Fred Pool 1 British-American, NW NE 29-11s-30e, 18 mi. SW Caprock townsite, dry, TD 750 ft. in salt.

Record Demand to Tax Refiners' Ingenuity

(Continued from page 41)

proving Engine Lubricating Oils Through the Use of Additives."

Actual lubrication of the engine is not a great deal more difficult now than it was 20 years ago and high-grade petroleum lubricating oils have sufficient lubricating properties, viscosity, and oiliness for any properly designed engine, they explained, but other functions, such as cooling, cleaning, and sealing the engine are becoming more difficult.

These functions require the use of additives, and there are 51 characteristics of lubricating oils which can be affected by additives. After discussing some of these additives and the results achieved, as well as the tests used in fixing their specifications, the authors declared that high octane gasolines frequently form engine deposits which are erroneously blamed on the lubricating oil. They suggested that this problem can best be solved by improvements in lubricating oils specifically designed to overcome this condition, adding:

"Experiments to date with gasoline additives have not shown much promise. Also, in order to treat all gasoline of this type now manufactured would present a tremendous burden on the industry. Therefore, this appears to be another problem for the petroleum additive chemist to solve via the lubricating oil."

Supply Problems to Be Discussed by N.P.A.

The ability of the oil industry to supply the predicted demands for oils in 1948-49, and the marketing problems arising out of that situation, will highlight the program of the general session of the forty-fifth semiannual meeting of the National Petroleum Association, Hotel Cleveland, Cleveland, Ohio, April 21-23.

The general session, which will include panel discussions, will cover such topics as military petroleum requirements; the problems to be met in supplying railroad diesel engines, tractors and engine-operated farm equipment, central oil heating units, and passenger automobiles. B. L. Majewski, vice president of Deep Rock Oil Corp., will report on the "Recent Marketing Experience and a Look Into the Future."

W. M. Holaday, director, Socony-Vacuum Laboratories, New York; Dr. Carl F. Pruttan, Lubrizol Corp., Cleveland, Ohio; and H. P. Ferguson, chief of refining control division, Standard Oil Co. of Ohio, will present papers at the joint meeting of the Department of Standards and Tests and the Department of Manufacture which will be held April 23.

Of interest to traffic men and executives will be a report on pipe-line and other transportation tariff problems, which will be presented by E. W. Chapdelaine, assistant chief of the Bureau of Traffic and chief of the Section of Tariffs for the Interstate Commerce Commission.

Distinguished Geologists to Address Houston Group

Dr. Gordon Rittenhouse, associate professor of geology at the University of Cincinnati, and Dr. J. W. Huddle, University of North Carolina, are scheduled to speak before the Houston Geological Society under the sponsorship of the Distinguished Lecturer Committee of the American Association of Petroleum Geologists.

Rittenhouse will discuss interpretation of sediments at a night meeting April 19, Huddle will speak on Devonian and Mississippian Paleography of Northeast Arizona May 10 at the society's luncheon. Scheduled for the society's luncheon May 12 is a discussion by Dr. Armstrong Price, Corpus Christi consultant, on temple mounds.

James W. Kisling, Jr., Tulsa, consultant who recently spent about a year with the Sinclair organization in Ethiopia, will address the society sometime in May on the regional geology of Eastern Ethiopia.

FORGED STEEL STOP AND GATE VALVES
These Valves having union bonnet, are supplied both inside Screw spindle also external type with yoke (as illustration). Carbon Steel, Nickel Alloy, Monel Metal, or Stainless Steel working parts are available according to the services for which they are intended. They have malleable iron "Coolgrip" handwheels and information discs indicating working pressures, etc. Literature describing these and other Valves and Fittings of interest to the Oil Industry available on request.
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STATISTICS and

WEEKLY WELL COMPLETIONS . . . WEEK ENDED APRIL 3, 1948

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1948				
	Comp.	Oil	Gas	Dry	Footage	1948	1947	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	28	14	0	*14	31,267	400	358	0	0	0	0	0	0	0	0	0	0
Pennsylvania	55	27	3	†25	113,776	737	825	0	0	0	1	1	0	0	4	11	15
West Virginia	16	0	12	‡4	49,002	191	215	0	0	1	1	2	2	0	15	19	36
Ohio	27	6	7	14	73,736	313	319	0	0	0	0	0	1	0	4	8	13
Indiana	23	12	0	11	37,934	238	134	0	0	0	2	2	2	0	0	4	6
Kentucky	8	2	4	2	22,713	153	120	1	0	0	0	1	2	0	0	3	5
Illinois	23	12	0	11	49,841	490	474	0	0	0	6	6	10	0	0	84	94
Michigan	6	2	0	4	15,947	167	159	0	0	0	2	2	5	0	4	66	75
Kansas	37	21	1	15	114,754	653	666	0	0	0	6	6	8	0	1	81	90
Neb., Mo., Iowa	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Oklahoma	63	32	2	29	214,224	926	1,074	1	0	0	11	12	33	3	6	153	195
Texas	213	140	10	63	948,430	2,658	2,126	8	1	2	36	47	80	8	27	473	588
North Central (Dist. 7-B & 9)	64	38	1	25	202,306	785	657	3	0	1	11	15	33	0	6	150	189
West (Dist. 7-C & 8)	47	39	2	6	221,615	718	509	0	0	0	5	5	10	0	1	48	59
Panhandle (Dist. 10)	14	12	2	0	42,542	147	122	0	0	0	0	0	0	0	1	3	4
Eastern (Dist. 5 & 6)	18	11	2	5	110,875	141	117	1	0	0	1	2	4	0	0	36	40
Gulf Coast (Dist. 2 & 3)	27	14	1	12	171,618	420	413	1	1	0	6	8	21	7	5	110	143
Southwest (Dist. 1 & 4)	43	26	2	15	199,474	447	308	3	0	1	13	17	12	1	14	126	153
Louisiana	27	13	2	12	162,576	460	294	0	0	0	6	6	7	5	1	48	61
Northern	14	8	1	5	46,867	293	146	0	0	0	2	2	0	0	0	23	23
Southern	13	5	1	7	115,709	167	148	0	0	0	4	4	7	5	1	25	38
Arkansas	3	2	0	1	12,915	79	60	0	0	0	1	1	2	0	0	21	23
Mississippi	6	1	2	3	50,537	102	87	0	0	0	1	1	2	0	3	24	29
Southeastern States	1	0	0	1	4,955	10	13	0	0	0	1	1	0	0	0	9	9
Montana	4	1	0	3	8,320	64	39	0	0	0	0	0	1	0	0	7	8
Wyoming	8	6	0	2	39,273	99	54	0	0	0	1	1	5	0	0	12	17
Colorado-Utah	4	3	0	1	28,159	67	43	0	0	0	1	1	0	0	0	12	12
New Mexico	10	7	1	2	41,287	157	137	0	0	0	1	1	2	1	0	9	12
California	57	51	1	5	223,612	691	489	1	0	0	2	3	6	0	0	66	72
Total United States	619	352	45	222	2,243,258	8,655	7,688	11	1	3	79	94	168	17	65	1,110	1,360
Total previous week	555	336	51	168	1,984,645	8,036	7,125	7	2	10	53	72	157	16	62	1,031	1,266
Total April 5, 1947	563	305	51	207	1,976,110			9	1	3	74	87	157	20	38	971	1,186

Service wells included: *14, †23, ‡1.

CRUDE PRICES AND REFINERY ACTIVITY

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$2.17	....	....	....
19-19.9	2.19	....	....	....
20-20.9	2.21	$2.25	....	$2.13
21-21.9	2.23	2.27	....	2.14
22-22.9	2.27	2.30	....	2.16
23-23.9	2.30	2.31	....	2.18
24-24.9	2.34	2.33	$2.06	2.20
25-25.9	2.38	2.35	2.08	2.22
26-26.9	2.41	2.37	2.09	2.24
27-27.9	2.45	2.39	2.62	2.26
28-28.9	2.49	2.41	2.64	2.28
29-29.9	2.53	2.43	2.66	2.30
30-30.9	2.56	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.62	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.56	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point. †Includes Lea County, New Mexico.

A. P. I. REFINERY REPORT, WEEK ENDED MARCH 27

(Thousands of barrels)

District—	Crude runs, daily avg.	Production: Gasoline†	Kerosine	Gas & dist. oil	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline*	Kerosine	Gas & dist. oil	Residual
East Coast	811	1,872	425	1,317	1,536	23,017	3,756	7,644	7,452
Appalachian:									
District 1	87	298	56	79	81	2,248	174	319	303
District 2	72	263	28	69	120	1,017	113	168	104
Ind., Ill., Ky.	818	2,732	452	954	1,024	21,698	1,842	3,529	3,056
Okla., Kans., Mo.	435	1,473	215	515	526	10,958	522	1,547	1,404
Inland Texas	260	1,102	124	192	439	4,306	312	310	826
Texas Gulf Coast	1,292	3,802	804	2,369	1,687	19,742	1,185	3,926	5,058
La. Gulf Coast	445	1,150	382	834	612	5,973	1,037	1,993	1,736
N. La. and Ark.	84	200	62	102	134	2,296	237	397	139
Rocky Mountain:									
New Mexico	11	36	4	10	25	89	25	16	30
Other Rocky Mtn.	144	373	42	168	284	3,336	112	667	678
California	865	2,482	53	1,073	2,386	18,311	1,144	10,201	27,548
March 27, 1948	5,324	15,783	2,647	7,682	8,854	112,991	10,459	30,717	48,334
March 20, 1948	5,344	15,600	2,531	7,472	9,006	113,247	9,948	30,723	47,603
March 29, 1947	4,790	14,255	2,033	5,885	8,600	105,731	9,917	31,610	43,235

*Finished and unfinished. †At refineries including natural blended.

Bureau of Mines crude-oil stocks 222,814,000 bbl. as of March 27—up 1,843,000 bbl. One year ago 227,529,000 bbl.

FLAT CRUDE PRICES

Representative posted schedules per bbl.	
East Texas	$2.65
Kettleman Hills, California*	2.14
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	5.00
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

TRENDS

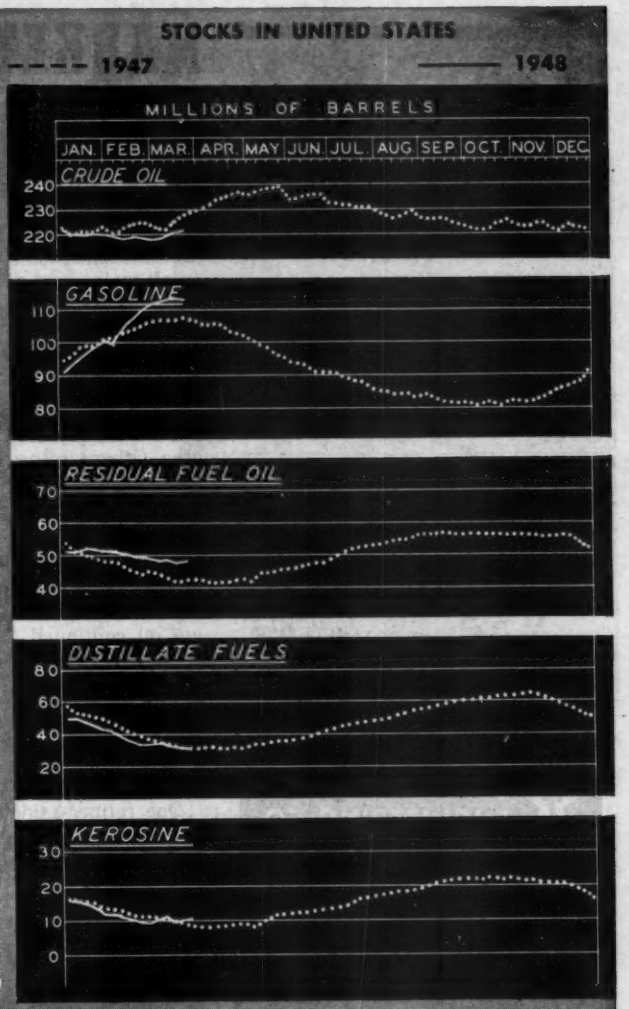
DAILY AVERAGE PRODUCTION FOR WEEK

	Apr. 3 crude oil	B. of M. Mar. demand	Mar. 27 crude oil
Alabama	1.000	1,500	1,500
Arkansas	87,100	83,000	85,500
California	945,300	930,000	945,800
Colorado	45,080	48,000	46,040
Eastern	67,100	64,900	65,200
Florida	825	1,000	825
Illinois	174,500	180,000	169,700
Indiana	18,300	16,000	18,700
Kansas	303,450	304,000	300,000
Kentucky	24,300	26,000	24,700
Louisiana	480,175	474,000	475,050
North Louisiana	126,200	.....	121,400
South Louisiana	353,975	.....	353,650
Michigan	42,350	46,000	48,600
Mississippi	115,235	116,000	120,060
Montana	23,270	24,000	24,100
Nebraska	450	600	450
New Mexico	128,375	128,000	128,950
Oklahoma	397,250	410,000	400,700
Texas	2,408,525	2,400,000	2,400,675
Dist. 1 (Southwest)	25,625	.....	25,475
Dist. 2 (Southwest)	171,200	.....	170,350
Dist. 4 (Southwest)	253,275	.....	253,200
Dist. 3 (Gulf Coast)	492,175	.....	491,350
Dist. 5 (Eastern)	44,550	.....	43,350
Dist. 6 (Eastern)	121,300	.....	121,225
East Texas Field	320,200	.....	323,000
Dist. 7-C (West)	44,100	.....	43,850
Dist. 8 (West)	672,100	.....	666,700
Dist. 7-B (W. Central)	43,725	.....	43,100
Dist. 9 (N. Central)	136,500	.....	135,675
Dist. 10 (Panhandle)	83,775	.....	83,400
Wyoming	140,400	137,000	141,940
Total United States	*5,402,965	5,390,000	5,398,490
Change from prev.-wk., up	4,495		

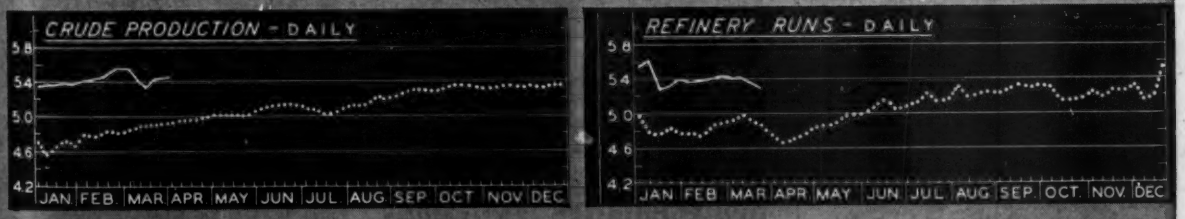
Total production January 1-April 3..... †508,010,755 bbl.
Same period last year (crude plus cond.).. 445,559,110 bbl.

*Not incl. 55,430 bbl. condensate. †Incl. 4,808,095 bbl. condensate.

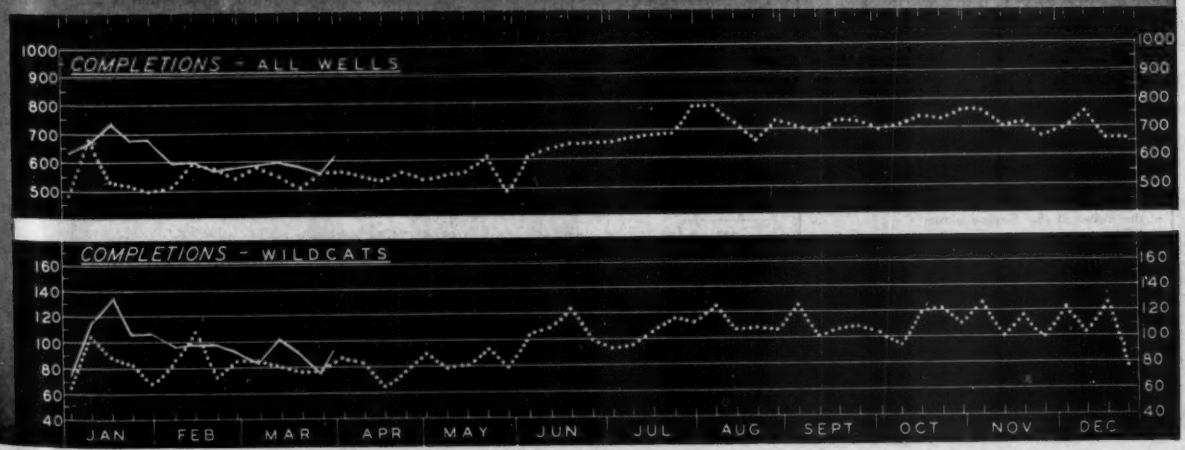
STOCKS IN UNITED STATES



DAILY OPERATIONS



WEEKLY COMPLETIONS



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$13.50 All Sizes

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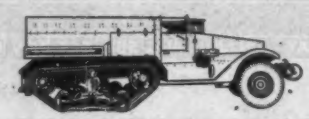
Brand new or slightly used HALF TRACK VEHICLES, powered by powerful White approximately 160 hp engines (mfgd. by White Motor Truck Co.). Can drive on front & rear axles; or front axle can be disengaged. Front tires are 8:25 x 20; ten speeds forward; two speeds reverse. Weighs approximately 14,000 lbs. With or without Tulsa Winch. Will travel 50 mph.



Excellent for use as a Combination Tractor-Truck-Wrecker; as a vehicle on which to mount cranes or other special equipment; for use wherever adverse terrain or weather conditions prevail; for snow-removal; for high-speed towing, excellent shop or service truck, etc.

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Established 1890

Pueblo, Colorado Phone 8404

MARKETS

ALONG the East Coast the reduction of products prices (not including gasoline) by Esso Standard Oil Co. has been followed by Shell Oil Co., Inc. Shell has followed suit in allowing 0.7 cent per gallon discounts on kerosine and home heating oil sales on all methods of delivery throughout the marketing areas, until September 1. Other major companies were said to be studying Esso's move but reported they did not contemplate similar action.

Some scattered price reductions in No. 5 were reported in the New York area. Otherwise price levels remained unchanged. But spot-market buyers were expressing hopes for more general reductions.

No. 2 Demand Off

In the Mid-Continent area slackening off in the demand for No. 2 burning oil continued although the price level remained generally the same. No shipments, however, were going at the "top prices" which this product was bringing a month ago. One marketer reported that he has been moving some No. 2 at between 10½ and 11 cents.

One refiner said that he was moving his regular gasoline at "13 cents and up," while another buyer said he was selling all he could obtain in the past week at 12½ cents. The number of requests for gasoline in the Mid-Continent area was reported to be picking up in the past week and heavy shipments could be expected to begin moving within 10 days, according to one supplier, who said that they would continue stronger as the peak consuming season is approached.

The general outlook on tank-car availability was that it was continuing to ease somewhat as the weather conditions continued favorable and the heavy movements of gasoline had not yet begin moving. Clean cars, however, even now were reported to be very tight. Dirty cars were more easily available due to the slackening off in shipments of the heavy burning oils.

Most suppliers were agreed that, although the agricultural demands would be extremely heavy, farm users would be given preference over other consumers and that they would be adequately taken care of.

One large marketer in the Mid-Continent area last week reduced the 130-132 crude-scale wax price from 8½ to 7½ cents. Lube oils were said to be continuing to hold their own and no change in the price level was reported. The crude wax reduction makes the second reduction in the past 2 weeks by leading marketers in this area.

No. 6 was reported continuing soft but that no appreciable effect was yet noted because of the coal strike.

Gulf Coast Quiet

Market activity was reported as generally quiet in the Gulf Coast area last week. Suppliers were said to be storing quantities of motor fuel in anticipation of heavy demand and higher prices in coming months. General opinion was that by May the gasoline market will be extremely tight. Present spot-market prices for regular grade were from 11 to 11½ cents. Heretofore high prices paid for burning oils on the spot market appeared to be down considerably. One source said jobbers were now being supplied largely by contract sources with no necessity to pay premium prices for supplemental material. However, movements of No. 2 and kerosine at 2 cents over publications prices, or 11 and 11⅜ cents were reported. The fuel oil market continued soft at prices ranging around $2.75 per barrel.

Representative Quotations

Representative spot-market quotations of leading suppliers as of April 5, 1948. Figures are f.o.b. plant for tank-car shipment in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor	Texas Gulf Coast
Regular gasoline, 73-75 octane	10½-11½	11.6-12* 10.5-12.2†	10.9-11½
Premium gasoline, 78-80 octane	11¾-12½	10.6-13.4	12.9-13
42-44 w.w. kerosine	9½-10½	10.2-12.2	10¼-12
No. 2 straw fuel oil	9⅛-10	9.3-11.1	9.05-11
No. 6 residual	$2.50-2.85	$3.03-3.90	$2.56-3.00

*Branded (74-76 octane); †Unbranded (74-76 octane).

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	8½	8	8¼
Grade 18-55	10.2	9.6	9.9

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-14.5
750 vis., No. 3-4 neutral	15-17.25
2,000 No. 5-6 neutral	17-18½

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	30-33
200 vis. No. 3 neutral, 0-10 pp.	20-21

Western Pennsylvania

145-155 vis. 10 p.t. bright stock	47
180 vis. p.t. neutral	45

CRUDE-SCALE WAX

Mid-Continent

130-132 A.S.T.M. melting point	7½-8

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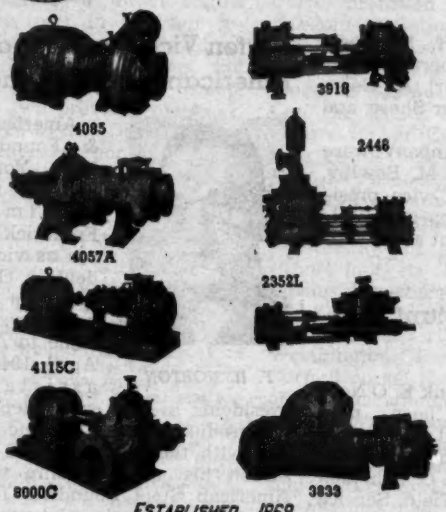

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WYTEFACE "A" Steel Tapes have raised black graduations on a crack-proof white surface. Easy to read in any light, from any angle. Designed for hard service. Resist rust and corrosion. Raised rims and markings protect the white background from abrasion from rails, pipe, rocks, concrete. Made in styles especially for Oil Riggers, Oil Gaugers and for general measurements. See your supply house, or write for details to Keuffel & Esser Co., Hoboken, New Jersey.

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WITH QUALITY!

CITIES SERVICE DEALERS are Solidly Sold on Top Quality, Cities Service Products

CITIES SERVICE

ASK THE CUSTOMERS. Ask the dealers. Ask anyone who knows and uses Cities Service petroleum products. You'll get the same enthusiastic answers.

Start with the raw crudes. They're right out of the best Pennsylvania and mid-continent fields. Go on to the refineries—massive, modern, highly efficient refineries such as the world's record breaking plant at Lake Charles, Louisiana.

Then as a clincher . . . try any of these famous, widely known Cities Service products . . . CISCO SOLVENT . . . CISCO PEP . . . CITIES SERVICE MOTOR OILS . . . CITIES SERVICE GASOLENES . . . plus four hundred others. They're all top quality, right on down the line. And every one is paying off in a big way for Cities Service dealers.

CITIES SERVICE OIL COMPANY

NEW YORK • CHICAGO

In the South: ARKANSAS FUEL OIL COMPANY

EQUIPMENT MEN ... in the News

Harrison Equipment Opens Branch Office

Two new branch offices which soon will be fully stocked to deliver all types of geophysical equipment from these key locations have been opened by Harrison Equipment Co., Houston geophysical and electronic supply company.

The new stores are located at 6234 Peeler Street, Dallas, and 1134 East Fourth Street, Tulsa.

Dallas R. Davis, former specialty cable consultant for geophysical laboratories with United States Rubber Co., was named manager of the Tulsa store. John Lamb, formerly of Harrison's Houston office, is assistant manager of the Tulsa location.

J. W. Stanfield, former resident salesman for Harrison Equipment Co., in Dallas, was named manager of the Dallas store. Before joining the Harrison organization approximately 3 years ago, Stanfield was in the purchasing department of National Geophysical Co., Dallas.

Harrison Equipment Co. was organized in 1942 to maintain and supply equipment to the geophysical and exploration departments of major oil companies and independent operators.

Baseheart Transferred To New York

John A. Baseheart sales engineer for Buda Co., has been transferred from the Chicago to New York office where he is in the export oil-field division. While stationed in Chicago, Baseheart spent about 4 years traveling as a service engineer for Buda. Recently he returned from a 4-month trip to Europe and North Africa.

Officers and Directors Elected

At the regular annual meeting of shareholders of Eagle-Picher Co., held recently in the company headquarters in the American Building, Cincinnati, the board of directors was reelected for the coming year. The directorate includes Joseph Hummel, Jr., Joel M. Bowlby, Arthur E. Bendelari, Vincent H. Beckman, Carl F. Hertenstein, Robert E. Mullane, John J. Rowe, Carl A. Geist, Miles M. Zoller, T. Spencer Shore, and Elmer Isern.

All officers of the company were reelected. They are Joel M. Bowlby, president; Carl A. Geist, vice president, secretary-treasurer; and William R. Dice, vice president and comptroller.

O'Neill Made Assistant To President

Frank E. O'Neill has been promoted to assistant to the president of M. O. Johnston Oil Field Service Corp. O'Neill has been active in the oil business in California since 1920. In 1933 he became associated with M. O. Johnston and served this organization as general manager until 1938 when he formed his own oil-field research and development business. During the war O'Neill spent 4½ years at U.S.C. as a special lecturer on petroleum engineering. Two years ago he rejoined the Johnston organization as chief engineer. In his new position he will coordinate service operations, manufacturing, sales, engineering, and the business aspects of Johnston's rapidly expanding business.

Norton Vice President of American Car & Foundry

F. H. NORTON

American Car & Foundry Co., New York, announces the appointment of Frederick H. Norton as vice president in charge of all sales for the company. Norton came to A.C.F. in April 1945 as an assistant vice president in the sales department. He graduated from Purdue University with the degree of B.S.M.E. He served his apprenticeship with the American Steel Foundries following which he was assigned to their Chicago office as sales engineer. In 1940 he was transferred to Washington to open a new office for the handling of the American Steel Foundries' activities with the Government and foreign agencies.

Norton succeeds R. A. Williams who has resigned as a director and vice president in charge of sales to accept the presidency of Standard Railway Equipment Manufacturing Co.

Changes in Export Division

Continental Supply Co., Dallas, has announced several personnel changes in the company's export division.

Julio Zumeta, for the past 2 years

(Continued on page 149)

To give all of their salesmen the latest information on changes in oil-field specialties manufactured by Patterson-Ballagh and to show them new manufacturing techniques, the executives of Patterson-Ballagh arranged to have their domestic sales organization flown to the main office and plant in Los Angeles. In attendance were: Sitting, E. M. Rees, export manager; A. L. Gooden; Robert Cyphess; W. W. Simpson; T. M. Smith, Jr.; and Robert Kimball. Standing, Cliff Divelbiss; R. W. Shira; R. C. Medearis; W. B. Gardner; J. M. Newton; J. P. Magoffin, district manager; J. B. Merritt, assistant general manager; H. H. Collins; Bill Bonner, Jr.; A. G. Colgin, Jr.; A. O. Wells; and W. E. Largey, advertising manager

Equipment Men

(Continued from page 148)

D.E.M.A. Holds Public Relations Meeting

Advertising manager and public relations directors of diesel engine manufacturers, met in Chicago recently to discuss topics related to their every-day jobs. It was the third annual session of the group, and, like the two previous meetings, it was arranged by the Diesel Engine Manufacturers Association.

Gordon Lefebvre, president of D.E.M.A., and president and general manager of Cooper-Bessemer Corp., opened the meeting by outlining the advantages gained by advertising and promotional men getting together occasionally to talk over common aims and problems.

Frank A. Uniack, director of public relations for the Cleveland Diesel Engine Division, General Motors Corp., discussed the importance of "Keeping Relations with Editors on the Right Basis." L. A. Harlow, advertising manager for Fairbanks, Morse & Co., put the question, "How Can the Diesel Industry Cope with Future Power Competition?" as the title of his talk. "Capitalizing upon User Experiences" was described by Delbert Kay, advertising manager of Nordberg Manufacturing Co.

Directing the group's attention to export markets, A. L. Davis told of "Using Advertising and Promotion to Sell Diesels Abroad." Davis is manager of the advertising department of Worthington Pump & Machinery Corp. George H. Amberg, secretary of the educational committee of D.E.M.A., gave a comprehensive report of "D.E.M.A.'s Educational Program." "Selling the Diesel Idea" was the topic chosen by Harold D. Ellis, public relations man for D.E.M.A.

Dale Cox, director of public relations for International Harvester Co., projected a film, "Profits Mean Progres for Everyone," recently developed by his company. Volney B. Fowler, director of advertising and public relations for Electro-Motive Division, General Motors Corp., talked on "Overcoming Negative Factors in Selling Diesel Engines."

LEGAL

Department of the Interior, Wind River Indian Agency, Fort Washakie, Wyoming. Notice is hereby given that sealed bids will be received until 2:00 P.M., Monday, May 17, 1948, at the Wind River Agency, Fort Washakie, Wyoming, for the leasing of the following parcels of Tribal lands, located in Fremont County, Wyoming, for oil and gas mining purposes: Township 4 North, Range 1 West, W.R.M., Unit No. 1, SW¼ of Section 28; containing 160 acres. Unit No. 2, NW¼ of Section 33; containing 160 acres. Unit No. 3, N½ SW¼ and Lots 3 and 4 (S½ SW¼) of Section 33; containing 153.03 acres. Separate leases will be drawn on the applicable Government form for each of the described three units. Bids may be made on one or more of the described units. The right is reserved to reject any and all bids. The successful bidder or bidders will be required to pay the cost of advertising, such cost to be prorated if there is more than one successful bidder. The leases will be sold to the highest responsible bidder for a cash bonus upon an acreage basis in addition to the royalty of 12½%. The successful bidder or bidders must enclose with their bids, a certified check or bank draft drawn upon a solvent bank in an amount equivalent to at least 20% of the bonus bid, plus 20% of the first year's rental at the rate of $1.25 per acre per annum, as a guaranty of good faith. The checks are to be made payable to the Treasurer of the United States. The leases must be completed and filed with this Office within 20 days from the date they are received by the successful bidder for execution and accompanied by payment of the remainder of the bonus bid, the balance of the first year's rental, a filing fee for each separate lease, and cost of the printed lease forms. Failure in any of these conditions may subject the bid to cancellation without further notice and forfeiture of payments already made. The adequacy of the bonus offers will be determined by the U. S. Geological Survey. Except as otherwise provided for in the approved lease form, no special provision is made requiring the lessee to drill a deep test well on any area leased under this notice of sale. A copy of the Tribal oil and gas lease form may be had upon request. The leases to be issued for the described three units of Tribal land will be made for a term of 10 years from date of approval by the Commissioner of Indian Affairs and as long thereafter as oil and/or gas is produced in paying quantities, in accordance with the provisions of the Act of May 11, 1938 (52 Stat. 347), and the regulations approved May 31, 1938, Title 25, Code of Federal Regulations, Part 186, as amended. The rate of royalty will be 12½% of the value of all oil, gas, and/or natural gasoline unless the lessor, with the approval of the Commissioner of Indian Affairs, elects to take royalty in kind. A suitable bond will be required, and such bond must be approved by the Department. The responsibility of complying with any requirements of the Federal Documentary Stamp Statutes will be left with the successful lessees. The bids should be addressed to the Superintendent, Wind River Agency, Fort Washakie, Wyoming, in an envelope plainly marked: Bid for Oil and Gas Mining Leases, to Be Opened 2:00 P.M., May 17, 1948. For further information, call or write Mr. Waller, Land Division of the Wind River Agency. J. M. Cooper, Superintendent.

Pottker Advanced by Oil Well Supply Co.

Appointment of Paul E. Pottker as assistant manager of sales for Oil Well Supply Co.'s Witte Engine Works Division at Kansas City, is announced by Lloyd Tracy, vice president—sales, for this U. S. Steel subsidiary.

A native of Peoria, Ill., Pottker attended University of Illinois. He joined the company as export manager of Witte Engine Works Division in November 1945, remaining in that capacity until his new appointment.

Frisch Elected Director

Martin Frisch, vice president in charge of engineering of Foster Wheeler Corp., has been elected a director of the corporation. Frisch joined the company in 1929 and was elected a vice president last year.

Lee Allen Swem, a director of the company, and assistant to the president for the past 3 years, was elected a vice president. Swem became associated with the company in 1936 as patent counsel.

Morse Chain Holds Sales Meeting

Morse Chain Co., Detroit, a Borg-Warner affiliate, held its annual sales meeting recently. Over 40 salesmen from all parts of the country attended to hear F. M. Hawley, president and general manager, discuss past and future business prospects for mechanical-power-transmission products.

The program included an address by R. P. Johnson, vice president and assistant general manager, on "Management's Support of Sales Objectives."

Announcement was made of the formation by Morse of a new Morse-Formsprag sales department which will market an entirely new line of overrunning clutches.

Formsprag Co., Ferndale, Mich., makers of overrunning indexing clutches, will continue manufacture of the Formsprag clutch, and its distribution in certain specialized fields.

Agruss Joins Precision Scientific

Dr. M. S. Agruss has been appointed director of the research and development department of Precision Scientific Co., Chicago. Previous to this appointment, Dr. Agruss was a consultant in the field of petroleum technology and chemistry, and was also research supervisor with Pure Oil Co. for 10 years. During the war years, he was a member of the Petroleum Industry War Council, as well as associated with the Manhattan Project.

Monsanto Names Sandidge

The appointment of Prescott Sandidge as assistant director, with responsibility for administrative matters, was announced recently by Central Research Department of Monsanto Chemical Co. Sandidge comes to Dayton from Oak Ridge, Tenn., where he was executive director of the Clinton National Laboratories, operated by Monsanto for the Atomic Energy Commission.

Smith on Survey Trip

Vernon A. Smith, vice president and general sales manager of Kenworth Motor Truck Corp., left Seattle late in March on an extensive business trip which will cover most of the United States.

Smith is making a general survey of business conditions and the truck and bus market. Included among the cities he will visit are Chicago, Detroit, New York, Winston Salem, New Orleans, Fort Worth, Salt Lake City, Phoenix, Los Angeles, and San Francisco.

ADVERTISERS

Allis-Chalmers Mfg. Co. 44
American Manufacturing Co. of Texas .. 4
American Rolling Mill Co., The 66
Arco Company, The 29
Armstrong Machine Works 109
Axelson Manufacturing Company 28
Baker Oil Tools, Inc. 50
Beacon Petroleum Co. 121
Beebe Bros. 140
Bovaird Supply Co., The 33
Bute Co., James 142
Byron Jackson Co. ..... Front Cover
Cable & Stine 132
Cameron Iron Works, Inc. 35
Chapman Valve Mfg. Co. 27
Chase Brass & Copper Co. 14
Classified Advertising 149, 150, 151, 152
Cleveland Trencher Company, The 125
Connelly, Inc. 121
Construction Machinery Co. 141
Continental Supply Co., The 19, 132
Crose Manufacturing Co., Inc., M. J. .. 124
Dean Brothers Pumps, Inc. 125
Dodge Division of Chrysler Corp. 12
Dowell Incorporated 48
Dragert Co., Inc., C. H. 132
du Pont 106
Eagle-Picher Company, The 139
Empire Trust Co. 142
Employers Mutual Liability Insurance Company of Wisconsin 18
Fairbanks-Morse & Co. 2
Fawick Airflex Co., Inc. 38
Fischer & Porter Co. 110
General American Transportation Corporation 82
General Controls 109
Gilmer Co., L. H. 6
Globe Steel Tubes Co. 41
Goodall Rubber Co. of Texas 72
Goodrich Company, B. F. 3
Grancell, I. H. 126
Graver Tank & Mfg. Co., Inc. 24, 25
Griscom-Russell Co., The 5
Gulberson Corporation 146
Haering & Co., Inc., D. W. 135
Halliburton Oil Well Cementing Co. 42
Happy Company, The 13
Honan-Crane Corp. 133
Hughes Tool Co. ..... Back Cover
Hunt Tool Company 10
Indian Drilling Mud Co., Inc. 128
International Harvester Co. 91
International Petroleum Exposition 36
Jarecki Manufacturing Co. 101
Jeffrey Manufacturing Company 26
Johns-Manville Corporation 138
Jones & Laughlin Supply Co. 23
Jones Co., The S. M. 11
Kearney & Mattison Co. 8
Keplinger and Wanenmacher 130
Kerotest Manufacturing Co. 115, 121
Kinley Co., M. M. 132
Kobe, Incorporated 21
Layne & Bowler, Inc. 110
Lehmann Machine Co. 116
Lincoln Electric Company, The 75
Link-Belt Company 34
Manning, Maxwell & Moore, Inc. 116
Marsh Steel Corp. 136
Mavor, James E. 122
McCord Corporation 127
McDowell Manufacturing Co. 137
McKee & Company, Arthur G. 40
McVean & Roberts 124
Midwestern Engine & Equipment Co., Inc. 93
Mission Mfg. Co., The 104
Mobar Corp. 15
Motorola, Inc. 37
Multi-Metal Wire Cloth Co., Inc. 134
Murphy Diesel Company 9
Murray Rubber Co. 46
National Airoil Burner Co., The 121
Northwestern Auto Parts Co. 127
Oakite Products, Inc. 137
Oil and Gas Journal, The 16, 17, 109, 121
Oklahoma Contracting Co., Inc. 123
Oshkosh Motor Truck, Inc. 90
Owen Tool Company 127
Parkhill Truck Co., Inc. 124
Patterson-Ballagh Division of Byron Jackson Co. 43
Penberthy Injector Co. 65, 126
Perrault Brothers, Inc. 122
Petroleum Electric Power Assn. 7
Reed Roller Bit Company 89
Refinery Engineering Co., The 85
Regan Forge & Engineering Co. 96
Reynolds Metals Co. 39
Rockford Clutch Division, Borg-Warner 125
Ross Heater & Mfg. Co., Inc. 20
Ross-Martin Co. 140
Sapulpa Tank Co. 92
Sheffield Steel Corp. 131
Stacey Bros. Gas Construction Co. 30
Standco Brake Lining Co. 127
Strom Steel Ball Co. 110
Tapecoat Company, The 123
Timken-Detroit Axle Co. 32
Timken Roller Bearing Company 45
Tretolite Company 31
Tubbs Cordage Co. 127
Twin Disc Clutch Co. 22
Unit Rig & Equipment Company ..... Inside Front Cover
United States Motors Corp. 142
United States Safety Service Co. 140
United States Treasury Department ... 47
United Supply & Manufacturing Co. ... 86
Universal Oil Products Co. 68, 69
Viking Pump Co. 134
Wagner Electric Corporation 115
Walworth Co. 1
Warner Lewis Co. 120
Well Equipment Mfg. Co. 98
Wheland Company, The 102
Williamson, Inc., T. D. 124
Wilson Supply Co. 95
Wyatt Metal & Boiler Works ..... Inside Back Cover

CALENDAR

April

American Petroleum Institute, Division of Production, southwestern district meeting, Plaza Hotel, San Antonio, April 14-16.

American Society of Lubricating Engineers, annual convention, Statler Hotel, Buffalo, N. Y., April 19-21.

American Chemical Society, 113th annual meeting, Chicago, April 19-23.

National Petroleum Association, Hotel Cleveland, Ohio, April 21-23.

Independent Petroleum Association of America, midyear directors' meeting, Broadview Hotel, Wichita, Kans., April 26-27.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, annual meeting, April 26-29, Shirley-Savoy Hotel, Denver.

Mid-Continent Oil and Gas Association, Annual Federal Tax Forum, Blackstone Hotel, Fort Worth, April 27-28.

May

Natural Gas Department, American Gas Association, annual spring meeting, Rice Hotel, Houston, May 4-5.

Interstate Oil Compact Commission, annual spring meeting, LaSalle Hotel, Chicago, May 5-7.

American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles, May 6-7.

American Petroleum Institute, division of refining, thirteenth midyear meeting, Benjamin Franklin Hotel, Philadelphia, May 10-13.

International Petroleum Exposition, Tulsa, May 15-22.

Gas Technology Short Course, sponsored by the Southern Gas Association, Texas A. & I. College, Kingsville, May 31.

June

Southern Gas Association, third annual short course in gas technology, Texas College of Arts and Industries, Kingsville, Tex., June 2-4.

National Oil Scouts & Landmen's Association, annual convention, Denver, June 3-5.

Petroleum Equipment Suppliers' Association, annual meeting, Broadmoor Hotel, Colorado Springs, June 6-8.

Kentucky Oil and Gas Association, annual meeting, Hotel Lafayette and Phoenix Hotel, Lexington, Ky., June 17-18.

American Society of Testing Materials, fifty-first annual meeting, Book-Cadillac Hotel, Detroit, Mich., June 21-25.

American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., June 30, July 1-2.

Canadian Gas Association, annual convention, Jasper Park Lodge, Jasper, Alta., June 30-July 3.

September

The Instrument Society of America, third instrument conference and exhibit, Philadelphia Convention Hall, Philadelphia, September 13-17.

Pacific Coast Gas Association, annual convention, Hotel Casa del Rey, Santa Cruz, Calif., September 14-16.

October

American Gas Association, annual convention, technical section, Ambassador Hotel, Atlantic City, October 4-9.

National Lubricating Grease Institute sixteenth annual convention, Edgewater Beach Hotel, Chicago, October 11-13.

American Association of Oilwell Drilling Contractors, eighth annual meeting, Rice Hotel, Houston, October 11-13.

Texas Mid-Continent Oil and Gas Association, twenty-ninth annual meeting, Fort Worth, October 14-15.

November

American Petroleum Institute, annual meeting, Stevens Hotel, Chicago, November 8-11.

American oil Chemists' Society, fall meeting and technical sessions, Pennsylvania Hotel, New York, November 15-18.

NOMADS

Houston Nomads, second Monday of each month, The Houston Club, Houston.

Los Angeles Nomads, second Wednesday each month, Jonathan Club.

New York Nomads, dinner and entertainment, Sherry's, 49th Street and Park Avenue.

Pike to Compare Atomic Energy, Petroleum Merits

HOUSTON.—Costs, merits, and other considerations regarding power from atomic energy as compared with present petroleum and coal fuels will be discussed by Sumner T. Pike, vice chairman of the U. S. Atomic Energy Commission, May 1 in Houston.

His discussion on "Economic Aspects of Atomic Energy" highlights a 1-day symposium of atomic-energy developments to be held under the sponsorship of the Engineers Council of Houston. The symposium will be the first of its kind held in the Southwest and invitations have been extended to the various technological, engineering, and scientific societies represented in the council. Pike will speak at the evening session; the afternoon meeting includes a talk on "Power Applications of Atomic Energy" by B. R. Prentice, assistant director of General Electric Corp.'s neucleonics project. The symposium will be held at the Rice Hotel.

TABLE OF CONTENTS ON PAGE 49